

## **MEMORANDUM**

Date: June 29, 2016

To: Mr. Heath Smith  
EPA On-Scene Coordinator  
U.S. Environmental Protection Agency, Region 7  
11201 Renner Boulevard  
Lenexa, Kansas 66219

From: Jenna Mead, RG, START Project Manager

Through: Ted Faile, PG, CHMM, START Program Manager

Subject: Hazard Ranking System Preliminary Scoring  
Laclede Coal Gas Site, Saint Louis, Missouri  
EPA ID: MOD981715980  
U.S. EPA Region 7 START, Contract No. EP-S7-13-06  
Task Order No. 0067  
Task Monitor: Heath Smith, On-Scene Coordinator

### **INTRODUCTION**

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Site Inspection (SI) at the Laclede Coal Gas site (the site) in Saint Louis, Missouri. In the late 1800s, the Laclede Gas and Light Company constructed a large coal gasification plant (Station “B”) on the property, which operated until the mid-to-late 1940s (see Appendix A, Figure 1). Purposes of the SI were to (1) evaluate whether former manufactured gas plant (FMGP)-related wastes (primarily semivolatile organic compounds [SVOC] from coal tar waste) were present at quantities that would prompt a removal action, and (2) determine the source of oil observed releasing from sediment of the Mississippi River immediately adjacent to the site during a site reconnaissance in October 2014. START completed sampling in October 2015, and an SI report was submitted February 9, 2016.

### **SITE DESCRIPTION AND HISTORY**

The site is at the northwest corner of N. 1<sup>st</sup> Street and Mullanphy Street, about 200 feet west of the Mississippi River levee/floodwall and about 500 feet south of the Stan Musial Veterans Memorial Bridge (Interstate 70). Geographic coordinates of the site are 38.642308 degrees (°) North latitude and

90.183333° West longitude (Google Earth 2014). The site is currently owned and operated by Center Point Terminal Company, LLC (CPT) for bulk storage of liquid asphalt. CPT is a subsidiary of World Point Terminals, LP, which is affiliated with Apex Oil Company, Inc. In previous reports, this facility is referred to as the Apex Oil Petroleum Fuel and Terminal (Apex Oil PFT) facility.

The Laclede Coal Gas site encompasses parcels 023400013 and 023400051, and is bounded north by Mound Street (not a thoroughfare), east by Commercial Street (formerly Levee Street), south by Mullanphy Street, and west by North 1<sup>st</sup> Street. The larger parcel (-51) houses five bulk storage tanks, while the smaller northeast parcel (-13) is grass-covered. The combined parcels form a rectangular area about 600 feet north-south by 350 feet east-west, and occupy an area of the Laclede Coal Gas site of approximately 4.78 acres. Figure 2 in Appendix A is a current conditions map. Figure 3 in Appendix A is a historical and current conditions map that includes an overlay of a 1909 Sanborn Fire Insurance map including the FMGP, as well as two tar tanks identified on a 1903 Sanborn Fire Insurance map and an 1897 Whipple Fire Insurance map. Most of the FMGP was located where the CPT facility stands today.

The grassy northeast corner of the site (parcel -13) is also referred to as the Mound Street Polychlorinated Biphenyl (PCB) site (MO0000093682)—a sub-site of this site. Buildings on the Mound Street PCB site were demolished in 1991.

A chain-link fence surrounds the petroleum tanks on the CPT property. East of the site are several railroad tracks, additional bulk storage tanks, a concrete flood wall, the Great Rivers Greenway Riverfront Trail, an abandoned pump house, and a barge dock on the Mississippi River. This area was formerly part of the Laclede site and is currently part of the CPT property. West of 1<sup>st</sup> Street, is the Missouri Department of Corrections – Division of Probation and Parole St. Louis Community Release Center. The Community Release Center is a living facility for about 500 offenders on probation or parole. A vacant parcel covered by pavement and building slabs (also owned by CPT) is north of Mound Street. An undeveloped, wooded parcel (owned by Wiggins Ferry Company) is across Mullanphy Street, south of the site.

## **SITE OPERATIONAL HISTORY**

In 1873, the Laclede Gas and Light Company (Laclede) began production of gas at a coal gasification plant (Station “B”) on the property. This plant operated until about 1945, and was maintained as a backup facility following the introduction of natural gas in 1949.

Laclede used a retort process for coal carbonization to generate gas. Station B, described as “the older and smaller” [of Laclede’s stations], produced a combination of natural gas and coal gas, manufactured to help during winter peak demand periods. The station consisted of five standard Lowe water gas sets producing about 4 million cubic feet of water gas a day. Station B also featured one retort facility that included 16 benches, each with eight 16-foot-long retorts. The coal gas retort house had a daily capacity of 0.5 million cubic feet of coal gas.

In 1911, Laclede began operating an electric generating station at the northeastern portion of the site (parcel -13) called Station E. In 1917, government officials asked Laclede to build stripping plants at two of its stations, including Station B for production of toluol. Toluol, a byproduct of coal or water gas, was used to manufacture toluene—used for manufacturing explosives during World War I.

In March 1945, the Laclede facility was sold to Union Electric Company (UE), which continued to operate electrical power Station E until 1973. UE did not manufacture coal gas at this site. In 1969, the Apex Oil Company (Apex) purchased the former coal gas works (parcel -51) from UE. Apex utilized the site as a tank farm for storage of petroleum fuels until the mid-1980s, when it became an asphalt product terminal.

In 1973, the UE property (parcel -13) was transferred to the Tenlis Company. Tenlis dismantled the power generation and transmission equipment. Transformer oil was reportedly disposed of by Midwest Oil Company. The dismantled equipment was sold as scrap metal. Ownership of the property transferred several times. In 1985, the property owner leased the building to an individual for an electric motor stripping operation. An oil fire occurred in the basement of the building in 1989, and the building was demolished in spring 1991.

## **PREVIOUS INVESTIGATIONS**

The United States Coast Guard (USCG) investigated oil slicks in the Mississippi River near the site three times between 1976 and 1987. The oil slicks were reportedly originating from the basement of the former electric plant Station E (also known as the Mound Street Power Plant) building; however, no specific source was identified. No samples were collected during any of the USCG investigations.

On April 8, 1987, the St. Louis City Division of Health conducted an investigation of the Mound Street Power Plant. Six oil samples were collected from the basement of the Mound Street building and were analyzed for PCBs. No PCB contamination was identified; however, no listing of detection limits was included with the data transmittal.

Prior to 1988, several interviewed tenants of the site suggested that the Apex Oil PFT had undergone numerous oil spills which caused flooding of the power plant basement. Another speculation was that the Tenlis Company had drained the transformers and hydraulic oil tanks on the property into the basement of the power plant. An interviewee indicated that the loading platform on the Mississippi River had been the source of several spills, which could explain the spills noted by USCG. Based on the interviews and results from analyses of samples, the most likely sources of the oil in the power plant basement were spills at the Apex Oil PFT.

Prompted by reports of oil accumulation in the facility and occasional oil releases to the Mississippi River, EPA Region 7 tasked the Ecology & Environment, Inc. (E&E) Field Investigation Team (E&E/FIT) to conduct a Preliminary Assessment (PA) of the Mound Street Power Plant site. Field activities occurred on September 17, 1987. E&E/FIT completed and submitted a PA report on June 23, 1988. Six samples of oil, water, and oil-water mixture were collected within the Mound Street Power Plant building basement, and two samples were collected from manholes in Mound Street during the PA. The samples were analyzed for PCBs. No PCBs were detected in any of the samples (1 milligram/kilogram [mg/kg] detection limit). The potential source of oil in the basement of the Mound Street Power Plant building (Mound Street PCB's site) was identified as the adjacent Apex Oil PFT. The report stated that Apex Oil PFT had undergone numerous spills, some of which had entered the Mound Street building basement. Transformers and hydraulic oil tanks in the basement of the Mound Street building allegedly had been drained and removed during the 1970s; however, no records confirming proper disposal of oil were available.

Based on results of the sampling by St. Louis Division of Health and the E&E/FIT, no PCB contamination was present within the oils in the basement of the former electric power plant (Mound Street Power Plant). No evidence suggested that the oil in the basement should contain PCBs. Initial concerns had been raised because of presence of large electric transformers on site. The evidence suggested that the oil in these transformers had been moved off site. The most likely point of origin of the oil was the Apex Oil PFT, several yards uphill from the former electric power plant.

The E&E/FIT conducted a site reconnaissance of the FMGP and the enclosed power plant properties on November 20, 1990, as part of preparation of the Laclede Coal Gas Screening Site Inspection (SSI) work plan. Seepage was observed coming from the foundation and piping system of the abandoned Mullanphy Pump House, formerly associated with the Mound Street Power Plant building. The pipes were reportedly plugged with concrete; however, seepage was leaching through the concrete. Because the pump house was on the eastern side of the flood levee wall, the seepage went directly into the Mississippi

River. During the site reconnaissance, no samples were collected and the seepage material was not described.

E&E/FIT conducted field activities during March 3-9, 1991, and submitted the SSI report on October 29, 1991. Sampling included collection of 13 subsurface soil, 12 surface soil, 6 groundwater, 6 surface water, 4 sediment, and 1 oil samples on and around the Apex Oil PFT property, including the vicinity of the Mound Street PCB site. Figure 4 in Appendix A shows the sampling locations. No samples were collected from the basement of the Mound Street Power Plant Building, as originally planned, because the building was being demolished at the time of SSI field activities. Samples submitted to the Contract Laboratory Program (CLP) laboratory were analyzed for volatile organic compounds (VOC), SVOCs, metals, and cyanides. None of the samples collected during the Laclede Coal Gas SSI was analyzed for PCBs.

Data from the samples identified cyanides; benzene, toluene, ethylbenzene, and xylenes (BTEX); and polycyclic aromatic hydrocarbons (PAH) as the major on-site contaminants. Cyanide was found in soil samples collected throughout the site within the 0- to 2-foot below ground surface (bgs) interval. Deeper soil samples contained even higher cyanide concentrations. The data indicated that PAH contamination, both in shallow and deep soil samples (at depths as great as 38 feet bgs), was restricted to small areas within the site. The most significant area of PAH contamination was found within the bermed tank farm. All groundwater samples contained cyanide, but only one groundwater sample (#204) contained PAHs and benzene.

Concentrations of cyanide and PAHs were detected above background levels in surface soil samples submitted to the CLP laboratory. Most of the site was found contaminated with cyanide at concentrations significantly above that of the background sample (6.7 mg/kg). PAH contamination in surface soils was less extensive than the cyanide contamination. Benzo(a)pyrene was detected at levels as high as 22 mg/kg, significantly above its background concentration of 0.70 mg/kg.

Subsurface samples also contained concentrations of cyanide, PAHs, and benzene significantly above background levels. Many of these highly contaminated samples had been collected within the central portion of the bermed Apex Oil PFT area. Cyanide contamination was found to be significant at 11+ feet bgs. Cyanide was detected at 860 mg/kg in a sample collected at 8-12 feet bgs, and at 250 mg/kg in another sample collected at 11-17 feet bgs—both results exceeding the EPA Regional Screening Level (RSL) for Industrial Use of 140 mg/kg. Laboratory data revealed significant PAH contamination: at four

of the sampling locations, PAH concentrations were at least five times greater than the background concentration. Benzene was detected at 150 mg/kg in sample #008.

Groundwater sampling data did not indicate a release of dissolved metals, concentrations of which were consistent with background levels. Concentrations of cyanide (590 and 1,600 micrograms per liter [ $\mu\text{g/L}$ ]) and benzene (93  $\mu\text{g/L}$ ) significantly exceeded background in two samples. Neither cyanide nor benzene was detected in background groundwater samples. Concentrations of total and dissolved arsenic, total lead, cyanide, and benzene exceeded Superfund Chemical Data Matrix (SCDM) and EPA benchmarks for drinking/tap water.

Discovery of a leak in a 6-inch pipeline at Apex Oil PFT was revealed in a 1993 response letter from the Terminal Manager of Apex Oil PFT to the St. Louis City Fire Inspector. Repairs to the pipeline led to disposal of approximately 2.5 barrels of oil/soil. Subsequently, the pipeline was taken out of service. The letter does not indicate the location of the pipeline.

In 1996, the Sverdrup Corporation, Inc. (Sverdrup) was tasked by EPA Region 7 to conduct an SSI at the Mound Street PCB site. Objectives were to investigate the threat to human health and the surrounding environment associated with the site, and potential for PCB contamination. The surface water pathway was the primary pathway of concern for the site, but groundwater and soil exposure pathways were also of concern because of possible contribution of these to the surface water pathway. The SSI report acknowledged that the Mound Street PCB site was a subsite of the Laclede Coal Gas site. Sverdrup conducted sampling during the first week of April 1996 and focused on obtaining data on PCB contamination at the site and possible migration of contamination to the Mississippi River, noting that previous investigations had focused only on the FMGP source contamination. Groundwater samples were collected from two existing monitoring wells (South Well and North Well) at the adjacent Apex Oil PFT facility. The South Well depth was 46.06 feet with 26.07-foot depth to groundwater, and North Well depth was 47.27 feet with 24.68-foot depth to groundwater. Locations of the two wells were determined to be between the potential source of PCB contamination from the Mound Street PCB site and the Mississippi River, on the east side of Commercial Street. Benzene was detected in the North Well at 38  $\mu\text{g/L}$  but was not detected above the detection limit in the South Well. Several PAHs also were detected in the sample from the North Well, whereas the sample from the South Well was non-detect for PAHs. PAHs detected in the North Well sample were acenaphthene at 86  $\mu\text{g/L}$ , fluorene at 29  $\mu\text{g/L}$ , phenanthrene at 26  $\mu\text{g/L}$ , and bis(2-ethylhexyl) phthalate at 32  $\mu\text{g/L}$ . PCBs were below detection limits in the samples from both the North and South Wells. These groundwater data appeared consistent with historical data obtained at the site.

## **2015 SITE INSPECTION**

Purposes of the 2015 SI were to (1) evaluate whether FMGP-related wastes (primarily SVOCs from coal tar waste) were present at quantities that would prompt a removal action, and (2) determine the source of oil observed releasing from sediment of the Mississippi River immediately adjacent to the site during a site reconnaissance in October 2014. Soil, groundwater, surface water, and sediment samples were collected and analyzed for VOCs, SVOCs, PCBs, pesticides, total petroleum hydrocarbons (TPH), metals, and cyanide. The following sections summarize significant analytical results above screening levels or much greater than background concentrations. Appendix B contains soil boring information and analytical data (Tables 1 through 19) from the SI report. Sample locations are shown on Figure 5 in Appendix A.

### **SOIL SAMPLES**

During the SI, surface and subsurface soil samples were collected from 17 boreholes (including one background soil boring [SB] location, [SB-17]) on and surrounding the FMGP. Surface soil samples were collected within 0 to 2 feet bgs, and subsurface soil samples were collected between 2 feet bgs and total depths of the respective boreholes, based on visual observations (staining), detection of odor, and photoionization detector (PID) readings. Significant results from soil sampling are summarized as follows:

#### **Soils – VOCs and TPH**

All VOC detections in surface soil samples were at concentrations less than EPA RSLs except for naphthalene in sample SB-15, reported at 120 mg/kg (exceeding the EPA RSL of 17 mg/kg). All VOC detections in subsurface soil samples were at concentrations less than EPA RSLs except for benzene and naphthalene in samples SB-3 and SB-9. Benzene was reported at 580 mg/kg in SB-3 and 6.4 mg/kg in SB-9, exceeding the EPA RSL of 5.1 mg/kg. Naphthalene was reported at 6,600 J mg/kg in SB-3 and 380 mg/kg in SB-9, exceeding the EPA RSL of 17 mg/kg (“J” denotes an estimated value).

Two of the 18 subsurface soil samples (SB-3 and SB-13) contained TPH – gasoline-range organics (GRO) levels of 1,950 and 489 mg/kg, respectively, exceeding the EPA RSL of 420 mg/kg.

TPH – diesel-range organics (DRO) in surface soil samples SB-8, SB-13, and SB-15 exceeded the EPA RSL of 420 mg/kg at concentrations of 787, 2,300, and 2,670 J mg/kg, respectively. TPH-DRO in subsurface soil samples SB-3, SB-4, SB-6, SB-7, SB-9, SB-12, SB-13, and SB-15 exceeded the EPA RSL

of 420 mg/kg at concentrations of 48,700, 540, 904, 619, 6,080, 3,900, 13,700 J, and 2,930 mg/kg, respectively.

### **Soils – SVOCs**

The following PAHs were detected in surface soil samples at concentrations greater than their respective EPA RSLs:

- Benzo(a)anthracene was detected above its EPA RSL of 2.9 mg/kg in samples SB-3, SB-4, SB-8, SB-9, and SB-15 at concentrations of 6.1, 3.1, 34, 3.8, and 93 mg/kg, respectively.
- Benzo(a)pyrene was detected above its EPA RSL of 0.29 mg/kg at concentrations ranging from 0.36 to 84 mg/kg in all samples except for SB-1, SB-16, and SB-17.
- Benzo(b)fluoranthene was detected above its EPA RSL of 2.9 mg/kg in samples SB-3, SB-4, SB-8, SB-9, and SB-15 at concentrations of 6.2, 3.4, 54, 4.1, and 110 mg/kg, respectively.
- Benzo(k)fluoranthene was detected above its EPA RSL of 29 mg/kg in sample SB-15 at 37 mg/kg.
- Dibenz(a,h)anthracene was detected above its EPA RSL of 0.29 mg/kg in samples SB-3, SB-4, SB-8, SB-9, SB-12, and SB-15 at concentrations of 0.63, 0.44, 9.1, 0.67, 0.32, and 13 mg/kg, respectively.
- Indeno(1,2,3-cd)pyrene was detected above its EPA RSL of 2.9 mg/kg in samples SB-8 and SB-15 at concentrations of 34 and 49 mg/kg, respectively.
- Naphthalene was detected above its EPA RSL of 17 mg/kg in sample SB-15 at 92 mg/kg.

The following PAHs were detected in subsurface soil samples at concentrations greater than their respective EPA RSLs:

- Benzo(a)anthracene was detected above its EPA RSL of 2.9 mg/kg in samples SB-3, SB-6, SB-7, SB-9, SB-13, and SB-15 at concentrations of 210, 19, 15, 44, 6.9, and 25 mg/kg, respectively.
- Benzo(a)pyrene was detected above its EPA RSL of 0.29 mg/kg in samples SB-1, SB-3, SB-5, SB-6, SB-7, SB-9, SB-11, SB-13, SB-14, and SB-15 at concentrations of 2.2, 180, 0.39, 13, 14, 42, 0.29, 11, 1.6, and 29 mg/kg, respectively.
- Benzo(b)fluoranthene was detected at or above its EPA RSL of 2.9 mg/kg in samples SB-1, SB-3, SB-6, SB-7, SB-9, SB-13, and SB-15 at concentrations of 2.9, 190, 16, 11, 34, 11, and 30 mg/kg, respectively.
- Benzo(k)fluoranthene was detected above its EPA RSL of 29 mg/kg in sample SB-3 at 60 mg/kg.
- Dibenz(a,h)anthracene was detected above its EPA RSL of 0.29 mg/kg in samples SB-1 and SB-6 at concentrations of 0.37 and 2.4 mg/kg, respectively.



- Indeno(1,2,3-cd)pyrene was detected above its EPA RSL of 2.9 mg/kg in samples SB-3, SB-6, SB-9, SB-13, and SB-15 at concentrations of 87.7, 5.4, 15, 9.1, and 15 mg/kg, respectively.
- Naphthalene was detected above its EPA RSL of 17 mg/kg in samples SB-3, SB-4, SB-6, SB-7, and SB-9 at concentrations of 3,100, 38, 19, 110, and 240 mg/kg, respectively.

Certain SVOC compounds were reported as undetected in samples SB-3, SB-4, SB-6, SB-7, SB-9, SB-12, SB-13, and SB-15; however, method detection limits for those compounds exceeded corresponding EPA RSLs.

### **Metals and Cyanide**

Arsenic was detected in surface soil sample SB-16 at 39.6 mg/kg—above its EPA RSL of 3 mg/kg and its USGS mean background concentration of 10.6 mg/kg. However, SB-16 was located on adjacent property upgradient of the site, and that arsenic detection probably is not attributable to the FMGP or current site operations. No detected metals concentrations in subsurface soil samples were significantly (at least 3 times) greater than the respective mean background concentrations, and thus detected metals concentrations likely represent natural conditions.

Cyanide in surface soil samples SB-3, SB-6, SB-8, and SB-15 exceeded the EPA RSL of 12 mg/kg at concentrations of 16.5, 14.2, 64.9, and 15.7 mg/kg, respectively. Subsurface soil sample SB-3 was the only sample in which the cyanide concentration (75.4 mg/kg) exceeded the EPA RSL of 12 mg/kg.

## **GROUNDWATER SAMPLES**

Groundwater samples were collected from nine boreholes (including one background location) just below the soil-groundwater interface. Significant results are summarized as follows:

### **Groundwater – VOCs and TPH**

All VOC detections were at concentrations less than EPA RSLs except for benzene and naphthalene. Benzene was reported at 110, 260, and 7.6 µg/L in samples GW-1, GW-3, and GW-6, respectively—exceeding the EPA MCL of 5 µg/L. Naphthalene was reported at 990 J, 3,200 J, 330, and 24 µg/L, respectively, in GW-1, GW-2, GW-3, and GW-6—exceeding the EPA RSL for tap water of 0.17 µg/L.

In 6 of the 10 groundwater samples (including the field duplicate), TPH-GRO was detected at concentrations ranging from 192 to 1,710 J µg/L—all significantly exceeding the EPA RSL for tap water of 5.5 µg/L. No TPH-GRO was detected in groundwater samples GW-4, GW-5, GW-8, GW-9 (background), and the field blank sample; however, the detection limit was 40 µg/L for those samples.

In 6 of the 10 groundwater samples (including the field duplicate), TPH-DRO was detected at levels ranging from 1,100 to 38,200 J µg/L— all significantly exceeding the EPA RSL for tap water of 100 µg/L. No TPH-DRO was detected in groundwater samples GW-4, GW-5, GW-8, GW-9 (background), and the field blank sample; however, the detection limit was 500 µg/L for those samples.

### **Groundwater – SVOCs**

The following SVOCs were detected at concentrations greater than their respective EPA MCLs or EPA RSLs for tap water:

- Acenaphthene was detected above its EPA RSL of 530 µg/L in sample GW-2 at 920 µg/L.
- Benzo(a)anthracene was detected above its EPA RSL of 0.012 µg/L in samples GW-1, GW-2, GW-3, GW-7, and GW-7-FD at concentrations of 2.7, 730, 350, 54, and 90 µg/L, respectively.
- Benzo(a)pyrene was detected above its EPA MCL of 0.2 µg/L in samples GW-1, GW-2, GW-3, GW-6, GW-7, and GW-7-FD at concentrations of 2.8 J, 740, 390, 7.7, 75, and 120 J µg/L, respectively.
- Benzo(b)fluoranthene was detected above its EPA RSL of 0.034 µg/L in samples GW-1, GW-2, GW-3, GW-5, GW-6, GW-7, and GW-7-FD at concentrations of 2.4 J, 780, 330, 2.1, 8.8, 88, and 140 J µg/L, respectively.
- Benzo(k)fluoranthene was detected above its EPA RSL of 0.34 µg/L in samples GW-2, GW-3, and GW-7-FD at concentrations of 310, 150, and 56 J µg/L, respectively.
- Chrysene was detected above its EPA RSL of 3.4 µg/L in samples GW-2, GW-3, GW-6, GW-7, and GW-7-FD at concentrations of 730, 320, 4.0, 55, and 92 µg/L, respectively.
- Dibenz(a,h)anthracene was detected above its EPA RSL of 0.0034 µg/L in sample GW-3 at 22 µg/L.
- Fluoranthene was detected above its EPA RSL of 800 µg/L in sample GW-2 at 1,300 µg/L.
- Fluorene was detected above its EPA RSL of 290 µg/L in samples GW-2 and GW-3 at concentrations of 920 J and 510 J µg/L, respectively.
- Indeno(1,2,3-cd)pyrene was detected above its EPA RSL of 0.034 µg/L in samples GW-2, GW-3, GW-6, and GW-7-FD at concentrations of 230 J, 86 J, 4.7 J, and 46 J µg/L, respectively.
- 2-Methylnaphthalene was detected above its EPA RSL of 36 µg/L in samples GW-1, GW-2, GW-3, and GW-6 at concentrations of 92, 1,600, 280, and 8.5 µg/L, respectively.
- Naphthalene was detected above its EPA RSL of 0.17 µg/L in samples GW-1, GW-2, GW-3, and GW-6 at concentrations of 310, 8,400, 690, and 28 µg/L, respectively.

- N-nitrosodiphenylamine was detected above its EPA RSL of 12 µg/L in sample GW-3 at 94 µg/L.
- Pyrene was detected above its EPA RSL of 120 µg/L in samples GW-2, GW-3, GW-7, and GW-7-FD at concentrations of 2,000 J, 1,500 J, 140 J, and 240 J µg/L, respectively.

### **Total Metals and Cyanide**

Multiple metals were detected in all groundwater samples. The field blank sample did not contain detectable levels of any metals. The following metals were detected at concentrations greater than their respective EPA MCLs or EPA RSLs for tap water:

- Aluminum was detected above its EPA RSL of 20,000 µg/L in sample GW-8 at 20,300 µg/L.
- Arsenic was detected above its EPA MCL of 10 µg/L in sample GW-4 at 32 µg/L.
- Beryllium was detected above its EPA MCL of 4 µg/L in sample GW-2 at 7 J µg/L.
- Cobalt was detected above its EPA RSL of 6 µg/L in samples GW-2, GW-4, and GW-8 at concentrations of 28 J, 12, and 40 µg/L, respectively.
- Iron was detected above its EPA RSL of 14,000 µg/L in samples GW-2, GW-3, GW-4, GW-8, and GW-9 at concentrations of 40,000 J, 16,300, 35,600, 89,600, and 26,000 µg/L, respectively.
- Lead was detected above its EPA MCL of 15 µg/L in samples GW-1, GW-2, GW-4, GW-8, and GW-9 at concentrations of 90, 1,150 J, 1,440, 208, and 73 µg/L, respectively.
- Manganese was detected above its EPA RSL of 430 µg/L in samples GW-2, GW-3, GW-4, GW-6, GW-7, GW-7-FD, GW-8, and GW-9 at concentrations of 6,820 J, 2,980, 2,410, 576, 499, 520, 5,100, and 433 µg/L, respectively.
- Selenium was detected above its EPA MCL of 50 µg/L in samples GW-3, GW-4, GW-5, GW-7, GW-8, and GW-9 at concentrations of 52, 60, 65, 94, 59, and 78 µg/L, respectively.
- Vanadium was detected above its EPA RSL of 86 µg/L in sample GW-8 at 100 µg/L.

Cyanide was detected in 7 of the 10 groundwater samples (including the field duplicate). Cyanide concentrations exceeded the EPA MCL of 200 µg/L in groundwater samples GW-1, GW-2, GW-3, GW-6, GW-7, and GW-7-FD, which contained estimated concentrations of cyanide at 695 J, 663 J, 239 J, 362 J, 468 J, and 403 J µg/L, respectively.

## **SEDIMENT SAMPLES**

Sediment samples were collected at five locations, including one background location, off the western bank of the Mississippi River, immediately adjacent to, upgradient of, and downgradient of the site.

Significant results are as follows:

### **Sediment – VOCs and TPH**

Sediment sample Sed-3, collected next to the former Mullanphy Pump House, contained 2-butanone and naphthalene at estimated concentrations of 4.8 and 3.4 mg/kg, respectively. Sed-4, collected approximately 200 feet upgradient of Sed-3, contained toluene at an estimated concentration of 0.007 mg/kg.

TPH-GRO was detected in sample Sed-3 at 89 mg/kg. TPH-DRO was detected in Sed-3 at 962 mg/kg.

### **Sediment – SVOCs**

All sediment samples contained detectable levels of multiple SVOCs, mainly PAHs. PAH concentrations from each location were added together and compared to total PAH threshold effect concentrations (TEC) and probable effect concentrations (PEC) established by the National Oceanic and Atmospheric Administration (NOAA) for screening organics in sediment. Sed-1-FD and Sed-2 contained total PAH concentrations of 2.78 and 4.9 mg/kg, respectively, exceeding the freshwater sediment TEC for total PAHs of 1.61 mg/kg. Sed-3 contained a total PAH concentration of 48 mg/kg, exceeding the freshwater sediment PEC for total PAHs of 22.8 mg/kg.

### **Sediment – Cyanide**

Sediment samples Sed-1, Sed-1-FD, and Sed-2 contained detectable levels of cyanide ranging from 0.51 to 0.63 mg/kg. Although these levels are not necessarily significant, locations of these samples were downgradient of groundwater samples GW-6 and GW-7, both of which contained significant levels of cyanide. This suggests that cyanide concentrations in sediments of the Mississippi River could continue to increase as groundwater continues to migrate toward the river.

### **Sediment – Fingerprint Analysis**

In an attempt to determine the source of oil observed releasing from sediment of the Mississippi River immediately adjacent to the site and next to the former Mullanphy Pump House, START collected a 4-ounce jar of sediment at location Sed-3 and submitted it to the USCG Marine Safety Laboratory for a

fingerprint analysis. Analytical results from this sample were compared to results from a sample of soil cuttings collected on site (also submitted to the USCG Marine Safety Laboratory) that had indicated coal tar contamination, based on staining and odor. Review of the analytical data by USCG Marine Safety Laboratory chemists indicated the following:

- Sample Sed-3 was collected from oily sediment leaching into the Mississippi River near the old Mullanphy Pump House. Analytical results indicated that this sample contained petroleum oil with characteristics most resembling those of moderately biodegraded intermediate fuel oil. A small amount of non-petroleum contamination was present.
- The sample of on-site soil cuttings was found to contain a complex mixture of hydrocarbons, both petroleum- and nonpetroleum-derived. Chemical characteristics of this sample differed from those of Sed-3, and the differences were not attributable to weathering or non-petroleum contamination.

USCG Marine Safety Laboratory chemists concluded that the two samples had not derived from a common source of petroleum oil.

## **SURFACE WATER SAMPLES**

Surface water samples were collected at five locations, including one background location, off the western shoreline of the Mississippi River, immediately adjacent to, upgradient of, and downgradient of the site. Surface water samples were collocated with sediment samples. Review of the analytical data indicated the following:

### **Surface Water – Metals**

Metals were the only analytes detected in surface water samples. The field blank did not contain a detectable level of any metal. The following metals were detected at concentrations exceeding their respective Missouri Water Quality Standards for aquatic life (AQL), as summarized below:

- Aluminum was detected above its Missouri Water Quality Standard acute AQL of 750 µg/L in samples SW-1, SW-1-FD, SW-2, SW-3, and SW-4 at concentrations of 1,080, 1,090, 1,360, 1,340, and 1,190 µg/L, respectively.
- Iron was detected above its Missouri Water Quality Standard chronic AQL of 1,000 µg/L in samples SW-1, SW-1-FD, SW-2, SW-3, and SW-4 at concentrations of 1,720, 1,790, 2,000, 2,050, and 1,970 µg/L, respectively.

## PRELIMINARY HAZARD RANKING SYSTEM SCORE

This draft HRS scoring memorandum was developed by application of HRS guidelines to evaluate groundwater ( $S_{gw}$ ) migration, surface water ( $S_{sw}$ ) migration, soil exposure ( $S_{se}$ ), and air migration ( $S_{air}$ ) pathways. The preliminary score for the site is as follows:

Pathway Score		
$S_{gw}$	=	Not Scored
$S_{sw}$	=	24.62
$S_{se}$	=	Not Scored
$S_{air}$	=	Not Scored
<b>OVERALL HRS SCORE = 12.31</b>		

The overall site score of 12.31 is based on scoring the surface water migration pathway as a worst-case scenario. The groundwater pathway was not scored because groundwater is not used in the area. The soil pathway was not scored due to the lack of residential and nearby population, and the air pathway was not scored because air sampling has not been conducted at the site. This scenario assumes PAH-contaminated soils exist to depth of 26 feet bgs at the entire site—based on observed releases to the Mississippi River and PAH contamination found in sediments immediately downgradient of the point of entry to the Mississippi River. A surface water intake for the Illinois American East Saint Louis Public Water Supply (PWS), which serves a population of 155,382, is across the river (about 2,000 feet east and 600 feet south [downstream] from the site). The scoresheets generated from Quickscore Version 3.1 are attached. The score is based on the following factors:

A likelihood of release score of 550 was assigned based on observed releases to the Mississippi River. Numerous PAHs were detected in the three sediment samples collected between the pump house and the eastward projection of Mullanphy Street. No PAHs other than bis(2-ethylhexyl)phthalate, a common laboratory contaminant, were detected in two background sediment samples collected upstream of the abandoned pump house.

An assumed worst-case scenario was contamination of the property (350 by 600 feet) to 26 feet bgs (sample SB-3 [24-26'] contained an estimated 6,600  $\mu\text{g/kg}$  of naphthalene)—equivalent to a volume of 202,222 cubic yards. This volume was divided by 2,500 from Table 2-5 of the HRS Rule, yielding a result of 81. Based on Table 2-6, this value yielded an assigned value of 1; however, this number is less than the default hazardous waste quantity factor value of 10. Consequently, the default value of 10 was assigned because the quantity of hazardous waste released at the site cannot be documented. A waste

characteristic value of 18 was calculated based on the toxicity/persistence of benzo(a)pyrene (10,000) and the default hazardous waste quantity factor value of 10.

Although the nearest intake is essentially across the river from the site, a targets score of 0 was assigned for the nearest intake. The Mississippi River is classified as a very large river having a discharge rate of over 100,000 cubic feet per second (cfs)—median flow of the Mississippi River measured at the U.S. Geological Survey gauging station at Saint Louis as of June 13, 2016, was about 250,000 cfs. Table 4-13 of the HRS Rule specifies assignment of a dilution factor of 0.00001 for very large streams. Table 4-14 of the HRS Rule assigns a dilution-weighted population value of 2 for a potential drinking water population between 100,001 and 300,000 using a very large river. A potential contamination population of 0.2 was calculated by dividing this population by 10.

A resources value of 5 was assigned based on the Missouri Department of Natural Resources classification of the Mississippi River in the Saint Louis area (segment from the Meramec River to North Riverfront Park) for irrigation, livestock and wildlife watering, and recreational use. The potential population and resources were added for a targets score of 5.2.

The likelihood of release score (550), waste characteristics score (18), and targets score (5.2) were multiplied, and then divided by 82,500 for a drinking water threat score of 0.62.

The Human Food Chain Threat was evaluated based on use of the Mississippi River as a fishery. A waste characteristic factor of 180 was determined by including a bioaccumulation factor (5,000) in the calculation. A targets population score of 20 was assigned based on an observed release in a fishery area with a hazardous substance having a bioaccumulation potential factor value of 500 or greater. Scoring a worst-case scenario for potential human food chain population, assumption was that between 100,000 and 1,000,000 pounds of fish is produced per year, and a human food chain population value of 310 was assigned based on Table 4-18 of the HRS Rule. This value was multiplied by the dilution factor (0.00001) for a very large river, and this number (0.0031) was divided by 10 for potential population of 0. The likelihood of release score (550), waste characteristics score (180), and total targets score (20) were multiplied, and then divided by 82,500 for a human food chain threat score of 24.

The Environmental Threat score is 0 based on a worst-case scenario. Potential targets consisted of threatened or endangered species and wetlands; no critical habitats were identified. Based on Table 4-23 of the HRS Rule, 75 points were assigned for habitat known to be used by a state endangered or threatened species (pallid sturgeon); however, when multiplied by the 0.00001 dilution factor, only 0.00075 point was assigned. Assumption was that the maximum 20 miles of wetlands was downstream

of the site, for a maximum value of 500 points, or 0.005 when multiplied by 0.00001 dilution factor. The points for wetlands and sensitive targets were added (0.00575), then divided by 10, and rounded to 0.

The drinking water threat score of 0.62 was added to the human food chain threat score of 24 for a total surface water score of 24.62 and a total site score of 12.31.

The Laclede Coal Gas site should not be considered for inclusion on the National Priorities List, based on the following factors:

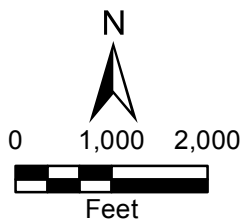
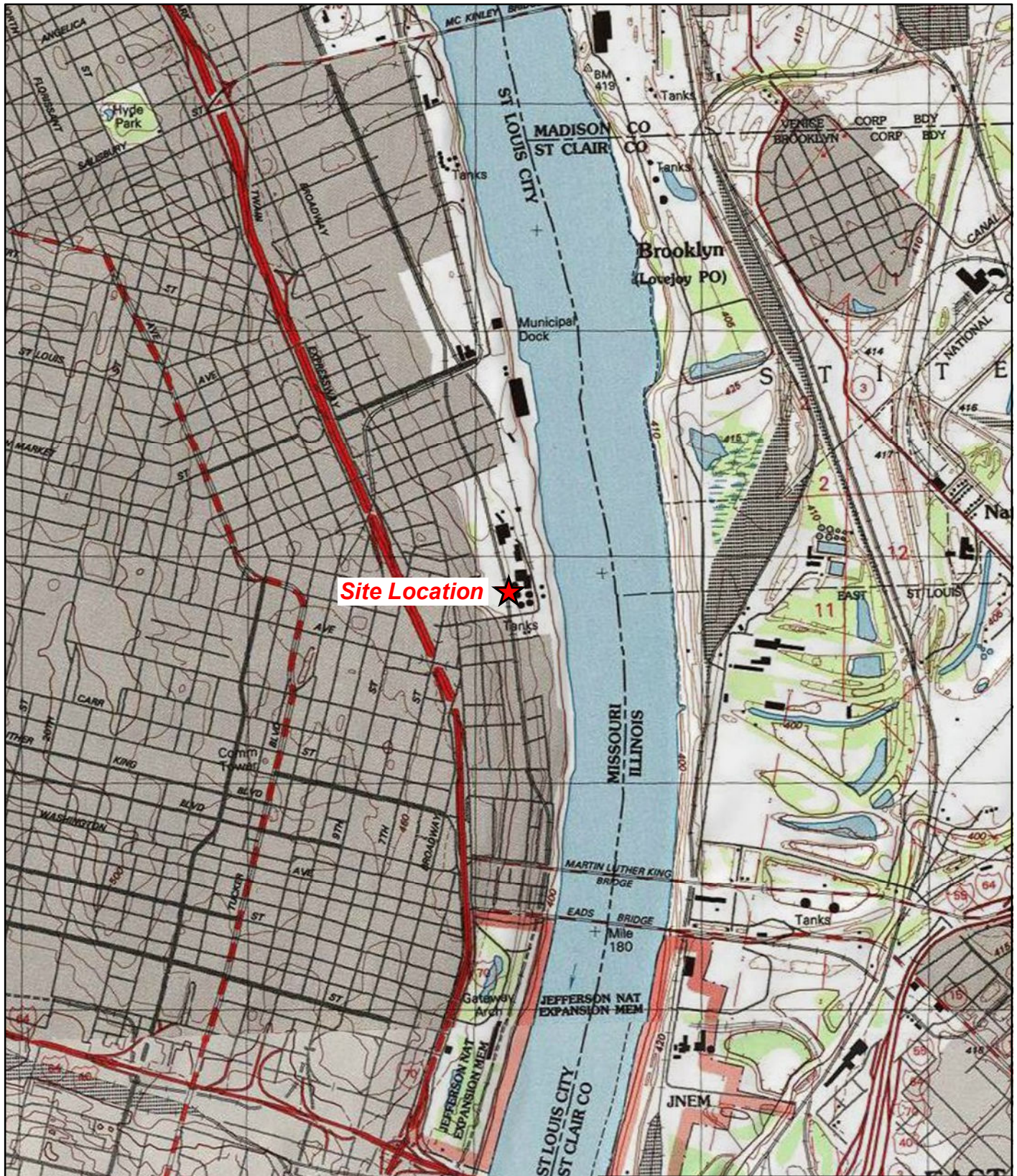
Drinking water intakes, wetlands, and threatened or endangered species are present within the 15-mile target distance limit (TDL); however, the Mississippi River is classified as a very large river (a flow over 100,000 cfs). In accord with the HRS Rule, a dilution factor 0.00001 is applied to the calculations, yielding very low potential target values. In essence, the Mississippi River carries so much water that it diminishes the threat of exposure to potential targets.

If you have any questions or comments regarding this submittal, please contact the Tetra Tech START Project Manager, Jenna Mead, at (816) 412-1771.



**APPENDIX A**  
**FIGURES**





Laclede Coal Gas Site  
St. Louis, Missouri

**Figure 1**  
Site Location Map



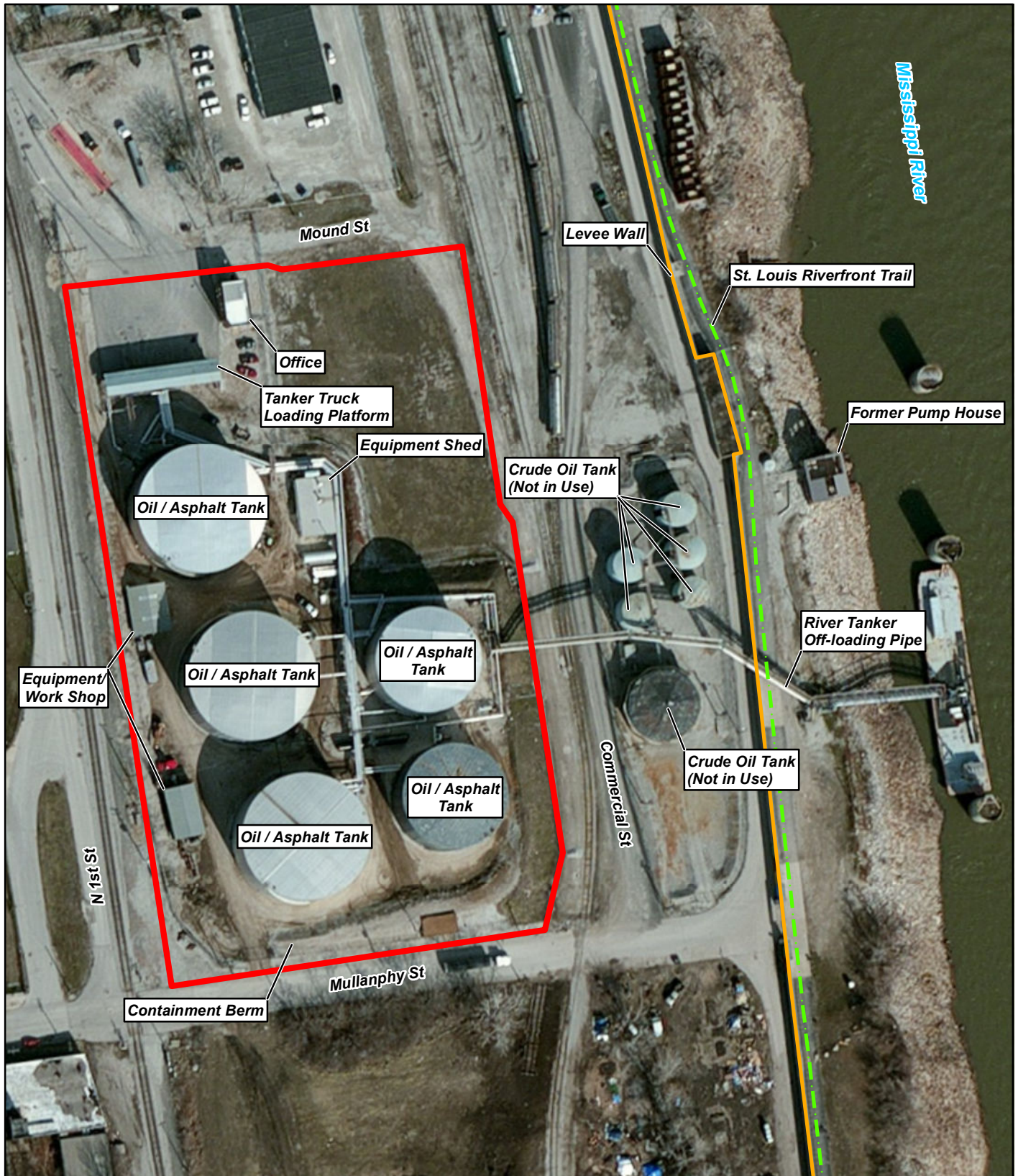
Source: USGS Cahokia, Missouri 7.5 Minute Topo Quad, 1998;  
USGS Granite City, Missouri 7.5 Minute Topo Quad, 1998

Date: 11/17/14

Drawn By: Nick Wiederholt

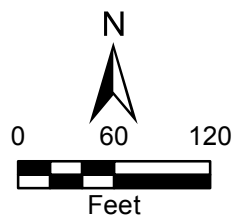
Project No: X9025.14.0067.000





#### Legend

- Levee wall
- - - St. Louis Riverfront Trail
- Approximate site boundary

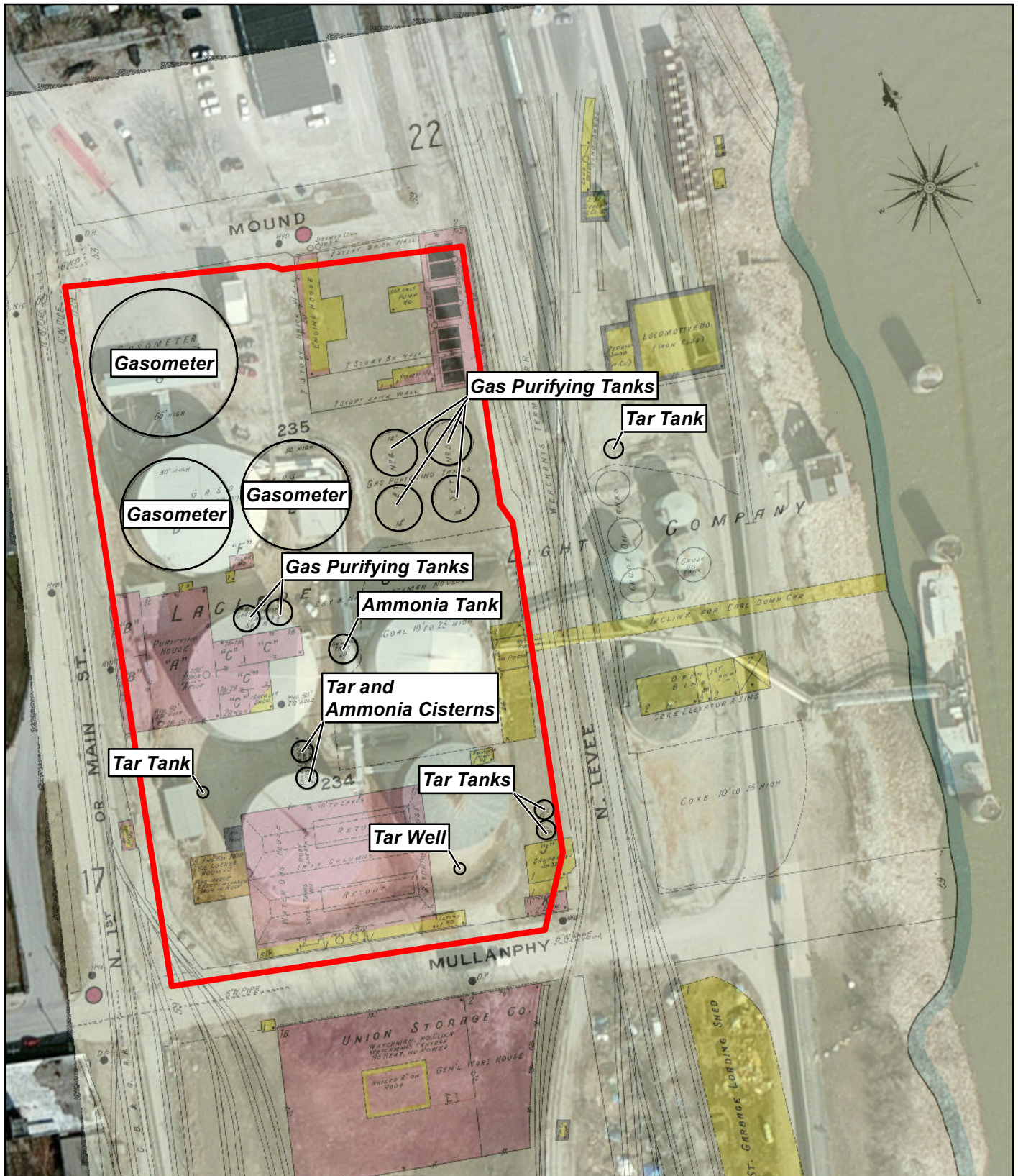


Laclede Coal Gas Site  
St. Louis, Missouri

**Figure 2**  
Current Conditions Site Layout Map

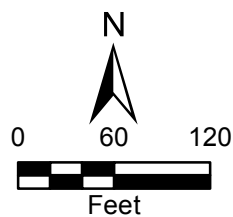






#### Legend

Approximate site boundary



Laclede Coal Gas Site  
St. Louis, Missouri

**Figure 3**  
Historical FMGP Overlay  
of Current Conditions



Source: ESRI, ArcGIS Online, World Imagery, 2012; Sanborn Fire Insurance Maps, 1903 & 1909; Whipple Fire Insurance Map, 1897

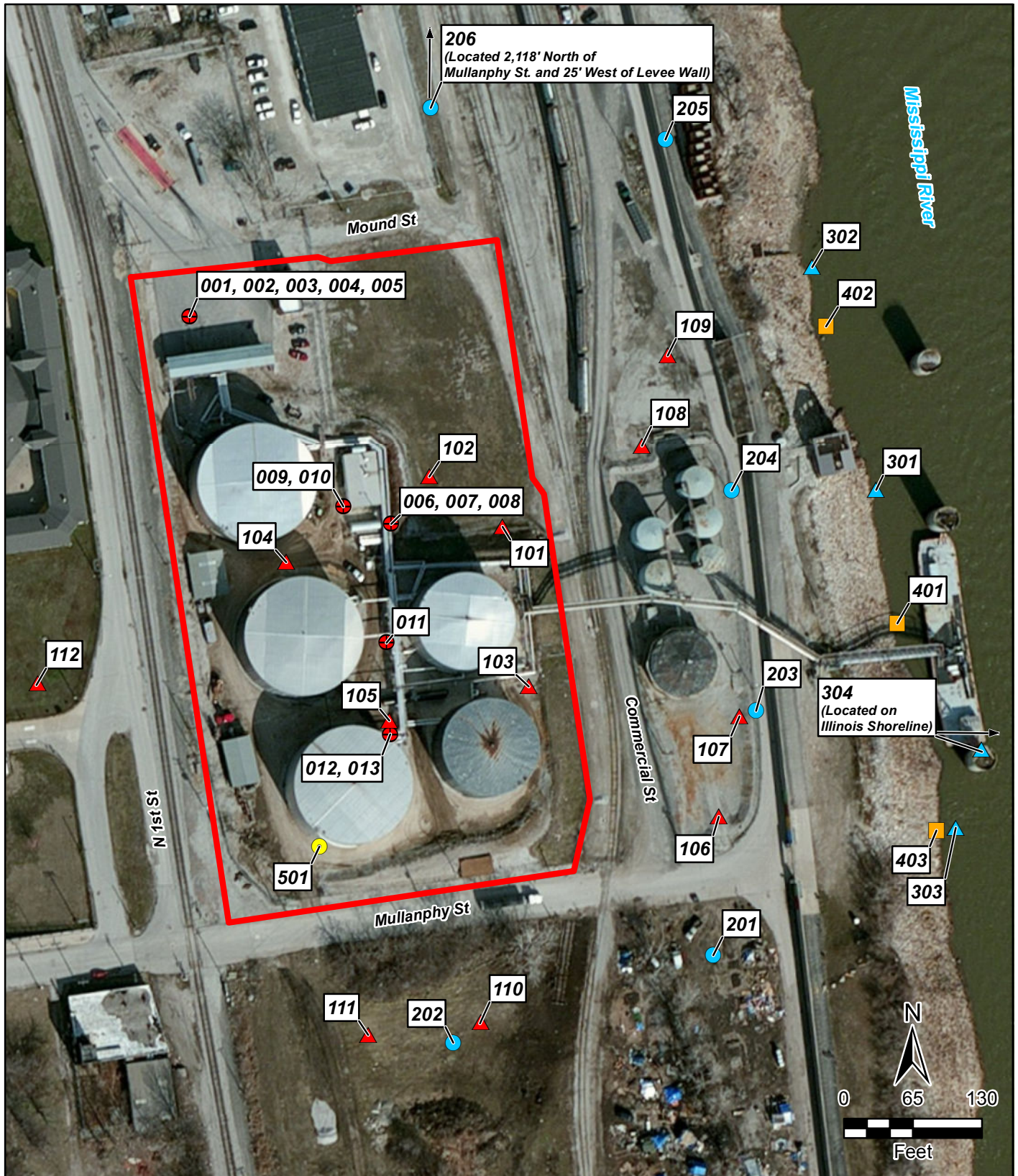
Date: 12/12/14

Drawn By: Nick Wiederholt

Project No: X9025.14.0067.000

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#### Legend

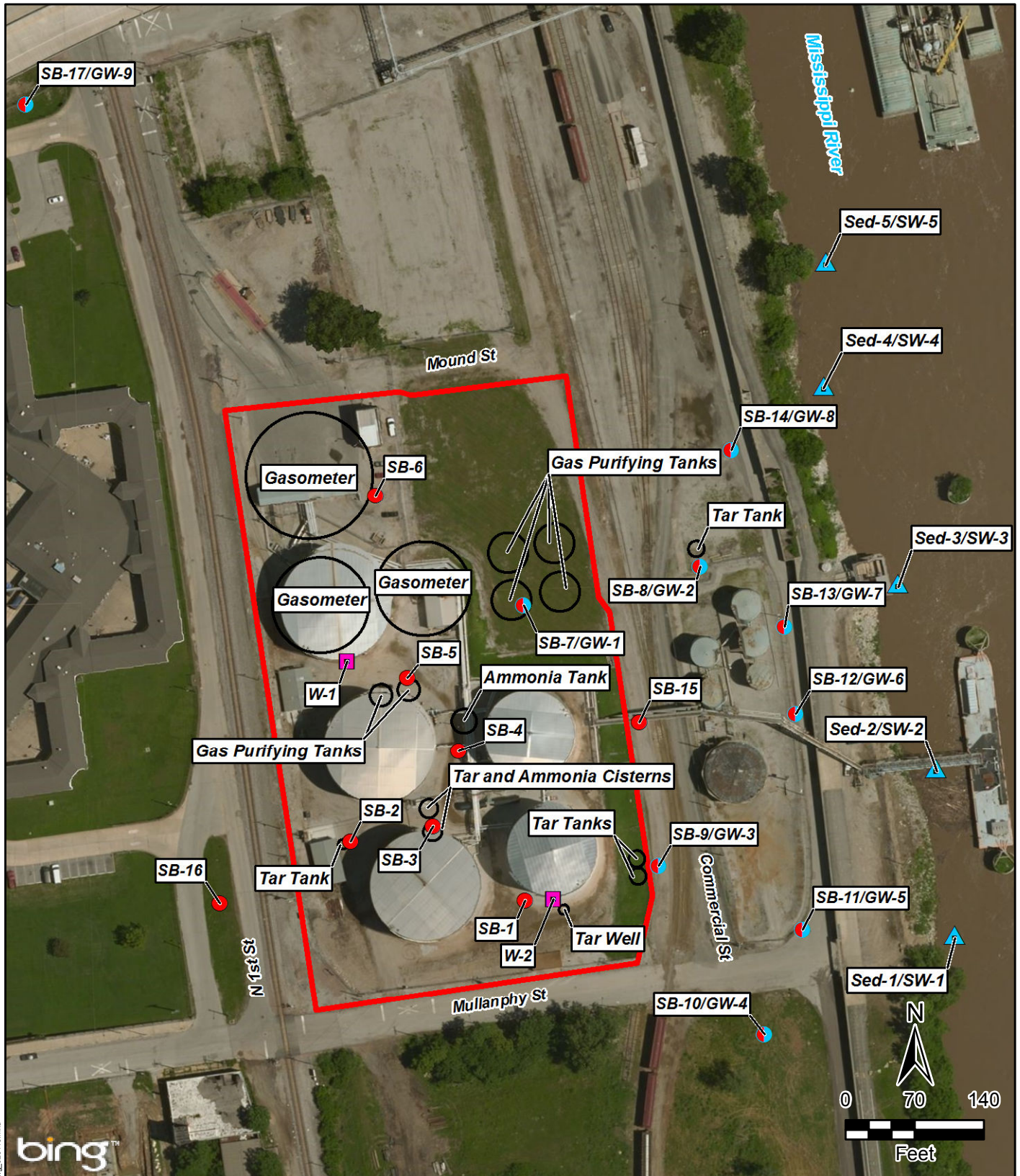
- |                          |                             |
|--------------------------|-----------------------------|
| 1991 SI Sample Locations | ● Sub-surface soil          |
| ● Groundwater            | ▲ Surface soil              |
| ● Oil / Asphalt tank     | ▲ Surface water             |
| ■ Sediment               | □ Approximate site boundary |

Laclede Coal Gas Site  
St. Louis, Missouri

**Figure 4**  
1991 SI Sample Location Map







#### Legend

- Product sample location
- ▲ Sediment / surface water sample location
- Soil sample location
- Soil / groundwater sample location
- Approximate site boundary
- Historical feature

Laclede Coal Gas Site  
St. Louis, Missouri

**Figure 5**  
Sample Location Map



## **APPENDIX B**

### **2015 SITE INSPECTION DATA TABLES**

**TABLE 1**  
**SUMMARY OF SOIL BORING LOGS**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Location	Depth From (ft)	Depth To (ft)	Soil Moisture	Soil Staining	Soil Odor	PID Results (ppm)	Soil Description/Other
SB-1	0	2	Wet	No	No	0	Sand fill.
	2	7	Moist	No	No	0	Brown clay with brick/fill throughout.
	7	8	Wet	No	Yes	0	Black stained clay with gravel mixed in
	8	13	NA	No	No	0	No soil recovery.
	13	14	Wet	No	Yes	0	Blackened stained clay with gravel mixed in.
	14	14	NA	No	No	0	Concrete - Refusal.
SB-2	0	2	Dry	No	No	0	Light gray fine soil with gravel mixed throughout.
	2	6	Moist	No	No	0	Brown/gray clay with gravel mixed
	6	7	Moist	No	No	0	Dark gray clay with gravel mixed throughout.
SB-3	0	2	Moist	No	No	0	Brown clay with brick/gravel mixture throughout.
	2	5	Moist	No	No	0	Dark brown/black clay with gravel/brick mixed throughout.
	5	8	Wet	No	No	0	Dark gray fine sand with slight petroleum odor.
	8	23	Wet	No	Yes	1	Brown sand with slight petroleum odor.
	23	26	Wet	No	Yes	167	Oily tar product.
SB-4	0	1	Dry	No	No	0	Fill material with gravel & fine brown top
	1	6	Moist	No	Yes	0	Brown clay with petroleum odor.
	6	15	Wet	No	Yes	13	Tar product mixed with soil & gravel. Heavy petroleum odor.
	15	18	Wet	No	No	13	Smooth tar product.
	18	34	NA	No	No	0	No soil recovery; Refusal at 34 ft bgs.
SB-5	0	2	Dry	No	No	0	Light brown soil mixed with gravel.
	2	5	Moist	No	No	0	Light brown clay with mixed gravel.
	5	23	Moist	No	No	14	Black clay stained with mild petroleum odor.
	23	30	Moist	No	No	0	Light brown clay; Refusal at 30 ft bgs.
SB-6	0	2	Dry	No	No	0	Fine soil with gravel/brick mixed throughout.
	2	17	Moist	No	No	0	Dark gray clay with gravel mixed throughout; Refusal at approximately 17 ft bgs.



TABLE 1 (Continued)

**SUMMARY OF SOIL BORING LOGS**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Location	Depth From (ft)	Depth To (ft)	Soil Moisture	Soil Staining	Soil Odor	PID Results (ppm)	Soil Description/Other
SB-7	0	1	Dry	No	No	0	Brown top soil mixed with gravel fill material.
	1	4	Moist	No	No	0	Brown clay with brick/gravel fill mixed throughout.
	4	8	Dry	No	No	0	Brick & gravel fill material.
	8	13	Wet	No	No	0	Brick & gravel fill material.
	13	18	Wet	No	Yes	0	Brick & gravel fill material; Slight petroleum odor.
	18	22	Wet	No	No	0	Brick & gravel fill material mixed with brown clay.
	22	23	NA	No	No	0	Rock; Refusal at 23 ft bgs.
SB-8	0	3	Moist	No	No	0	Black top soil mixed with gravel fill material.
	3	8	Moist	No	No	0	Brown silty/clay soil with gravel/wood mixed throughout.
	8	13	Moist	No	No	0	Very little recovery; Gray clay mixed with gravel/wood.
	13	18	Moist	No	No	0	
	18	33	Moist	No	No	0	Gray clay mixed with gravel/wood material.
SB-9	0	2	Dry	No	No	0	Top soil mixed with gravel fill.
	2	15	Moist	No	No	0	Sludgy tar coal material mixed with soil; Heavy petroleum odor; No recovery from 2-15 ft bgs.
SB-10	0	1	Dry	No	No	0	Light brown top soil with small gravel mixed throughout.
	1	5	Dry	No	No	0	Black dirt mixed with small pieces of brick/gravel.
	5	32	Wet	No	No	0	Dark brown/gray clay with traces of sand and small pieces of brick/gravel mixed
SB-11	0	2	Moist	No	No	0	Top soil with mixed brick/gravel.
	2	13	Wet	No	No	0	Silty soil mixed with brick/gravel.
	13	16	Wet	No	No	0	Brown/gray clay with gravel /brick mixed throughout.
SB-12	0	3	Dry	No	No	0	Dark brown/black soil with gravel mixed throughout.
	3	9	Wet	No	No	0	Black silty dirt mixed with gravel.
	9	11	Wet	No	No	0	Dark gray clay with gravel.
	11	20	Wet	Yes	Yes	0	Black sandy soil with sludgy black material throughout. Strong petroleum odor.

**TABLE 1 (Continued)**

**SUMMARY OF SOIL BORING LOGS  
Laclede Coal Gas Site, St. Louis, Missouri**

Location	Depth From (ft)	Depth To (ft)	Soil Moisture	Soil Staining	Soil Odor	PID Results (ppm)	Soil Description/Other
SB-13	0	3	Dry	No	No	70	Light gray silty soil mixed with gravel/asphalt.
	3	5	Moist	No	No	8	Black sandy soil with gravel.
	5	9	Wet	No	No	7	Silty dark gray clay with gravel.
	9	10	Wet	No	Yes	0	Brown sand with gravel.
	10	12	Wet	No	Yes	7	Dark gray clay with gravel.
	12	14	Wet	Yes	Yes	12	Black stained silty sand.
	14	20	Wet	Yes	Yes	39	Black stained gray silty clay with gravel throughout; Yellow colored moisture emitting from soil.
SB-14	0	3	Dry	No	No	0	Dark brown soil mixed with gravel/asphalt pieces.
	3	8	Moist	No	No	0	Dark brown silty clay with gravel.
	8	14	Moist	No	No	0	Light brown/gray silty clay.
	14	15	Wet	No	No	0	Black sand.
	15	24	Moist	No	Yes	0	Gray/brown smooth/soft clay with gravel mixed throughout; Slight odor.
SB-15	0	2	Dry	No	No	0	Dark brown soil mixed with gravel fill
	2	4	Dry	No	No	0	Black stained clay with gravel/asphalt mixed in.
	4	11	Wet	Yes	Yes	0	Black/gray clay mixed with gravel.
	11	35	Moist	No	No	0	Light brown/gray clay with gravel.
SB-16	0	3	Dry	No	No	0	Top soil mixed with miscellaneous fill
	3	8	Moist	No	No	0	Light brown clay with gravel throughout.
SB-17	0	3	Dry	No	No	0	Light brown soil mixed with gravel/brick.
	3	12	Moist	No	No	0	Light brown clay with gravel.
	12	36	Wet	No	No	0	Dark gray silty clay with gravel throughout.

Notes

bgs      Below ground surface  
ft        Feet  
NA        Not applicable  
PID       Photoionization detector  
ppm       Parts per million

TABLE 2

SUMMARY OF VOC AND TPH-GRO ANALYSES OF SURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Analyte	EPA RSL for Industrial Soil (mg/kg)	Sample Number and Results (mg/kg)																	
		SB-1 (0-2')	SB-2 (0-2')	SB-3 (0-2')	SB-4 (0-2')	SB-5 (0-2')	SB-6 (0-2')	SB-7 (0-2')	SB-8 (0-2')	SB-9 (0-2')	SB-10 (0-2')	SB-11 (0-2')	SB-12 (0-2')	SB-13 (0-2')	SB-14-FD (0-2')	SB-14 (0-2')	SB-15 (0-2')	SB-16 (0-2')	SB-17 (0-2')
Benzene	5.1	0.008 U	0.0056 U	0.0053 U	0.0069 U	0.015 U	0.027	0.0054 U	0.031	0.023	0.0074 U	0.0075 U	0.0087 U	0.0054 U	0.27 U	0.26 U	0.84	0.0065 U	0.0049 U
Carbon Disulfide	3,500	0.008 U	0.0056 U	0.019	0.0069 U	0.015	0.0063	0.0085	0.014	0.0054 U	0.013	0.0075 U	0.0087 U	0.0054 U	0.27 U	0.26 U	0.28 U	0.0065 U	0.047
Cyclohexane	27,000	0.008 U	0.0056 U	0.0053 U	0.0069 U	0.015 U	0.0063 U	0.0054 U	0.007 U	0.0054 U	0.0074 U	0.0075 U	0.0087 U	0.016	0.27 U	0.26 U	0.28 U	0.0065 U	0.0049 U
Ethyl Benzene	25	0.008 U	0.0056 U	0.0053 U	0.0069 U	0.015 U	0.0063 U	0.0054 U	0.007 U	0.0058	0.0074 U	0.0075 U	0.0087 U	0.0054 U	0.27 U	0.26 U	0.32	0.0065 U	0.0049 U
Methylcyclohexane	NE	0.008 U	0.0078	0.0053 U	0.0069 U	0.015 U	0.0063 U	0.0054 U	0.011	0.0054 U	0.0074 U	0.0075 U	0.0087 U	0.17	0.27 U	0.26 U	0.28 U	0.0065 U	0.0049 U
Naphthalene	17	0.016 U	0.011 U	0.011 U	0.07	0.068	0.024	0.021	0.06	0.05 J	0.15 J	0.015	0.017 U	0.011 U	0.54 U	0.53 U	<b>120</b>	0.013 U	0.0099 U
Tetrachloroethene	100	0.008 U	0.0056 U	0.01	0.0069 U	0.015 U	0.0063 U	0.0054 U	0.007 U	0.0054 U	0.0074 U	0.0075 U	0.0087 U	0.0054 U	0.27 U	0.26 U	0.28 U	0.0065 U	0.0049 U
Toluene	47,000	0.008 U	0.0096	0.0053 U	0.0069 U	0.015 U	0.0063 U	0.03	0.046	0.013	0.0074 U	0.0075 U	0.0093	0.0054 U	0.27 U	0.26 U	0.97	0.0065 U	0.0049 U
m and/or p-Xylene	2,400	0.016 U	0.011 U	0.011 U	0.014 U	0.03 U	0.013 U	0.011 U	0.015	0.011 U	0.015 U	0.015 U	0.017 U	0.011 U	0.54 U	0.53 U	1	0.013 U	0.0099 U
o-Xylene	2,800	0.008 U	0.0056 U	0.0053 U	0.0069 U	0.015 U	0.0063 U	0.0054 U	0.007 U	0.0054 U	0.0074 U	0.0094	0.0087 U	0.0054 U	0.27 U	0.26 U	0.39	0.0065 U	0.0049 U
TPH-GRO	420*	2.73 U	2.13 U	2.44 U	2.61	2.49 U	4.86	2.22 U	3.03 U	4.16	3.3	3.71	2.61 U	153	2.28 U	2.22 U	6.5	2.6	27.3

Notes

Bold value indicates result is greater than EPA RSL for industrial soil.

\* Represents most conservative value given for aliphatic and aromatic ranges of TPH-GRO.

EPA U.S. Environmental Protection Agency

' Feet

FD Field duplicate

GRO Gasoline-range organics

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

mg/kg Milligrams per kilogram

NE None established

RSL Regional screening level

TPH Total petroleum hydrocarbons

U Analyte not detected above method detection limit, which is the value presented.

VOC Volatile organic compound

TABLE 3

SUMMARY OF SVOC AND TPH-DRO ANALYSES OF SURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Analyte	EPA RSL for Industrial Soil (mg/kg)	Sample Number and Results (mg/kg)																	
		SB-1 (0-2')	SB-2 (0-2')	SB-3 (0-2')	SB-4 (0-2')	SB-5 (0-2')	SB-6 (0-2')	SB-7 (0-2')	SB-8 (0-2')	SB-9 (0-2')	SB-10 (0-2')	SB-11 (0-2')	SB-12 (0-2')	SB-13 (0-2')	SB-14-FD (0-2')	SB-14 (0-2')	SB-15 (0-2')	SB-16 (0-2')	SB-17 (0-2')
Acenaphthene	45,000	0.18 UJ	0.18 U	0.65	1.3	0.19 U	0.21 U	0.5	5.5 U	0.29	0.2 U	0.19 U	0.53	0.2	0.19 U	0.19 U	16	0.2 U	0.19 U
Acenaphthylene	NE	0.18 U	0.18 U	0.21 U	0.24	0.19 U	0.21 U	0.19 U	18	1.7	0.2	0.19 U	1.2	0.18 U	0.19 U	0.19 U	46	0.2 U	0.19 U
Anthracene	230,000	0.18 U	0.18 U	2.5	2.5	0.41	0.21 U	1.1	9	2	0.22	0.19 U	1.7	0.18 U	0.19 U	0.22	74	0.2 U	0.19 U
Benzo(a)anthracene	2.9	0.18 U	0.48	<b>6.1</b>	<b>3.1</b>	1.1	0.43	1.9	<b>34</b>	<b>3.8</b>	1.2	0.28	2.1	0.23	0.53	0.6	<b>93</b>	0.2 U	0.19 U
Benzo(a)pyrene	0.29	0.18 U	<b>0.55</b>	<b>4.7</b>	<b>2.6</b>	<b>1</b>	<b>0.36</b>	<b>1.7</b>	<b>35</b>	<b>4</b>	<b>1.1</b>	<b>0.3</b>	<b>2.2</b>	<b>0.36</b>	<b>0.67</b>	<b>0.71</b>	<b>84</b>	0.2 U	0.19 U
Benzo(b)fluoranthene	2.9	0.18 U	0.7	<b>6.2</b>	<b>3.4</b>	1.4	0.47	2	<b>54</b>	<b>4.1</b>	1.3	0.4	2.6	0.4	0.97	0.95	<b>110</b>	0.2 U	0.19 U
Benzo(g,h,i)perylene	NE	0.18 U	0.19	1.1	1	0.53	0.25	1.1	39	2.7	0.76	0.23	1.5	0.3	0.62	0.54	55	0.2 U	0.19 U
Benzo(k)fluoranthene	29	0.18 U	0.2	1.9	1.2	0.43	0.21 U	0.82	21	1.4	0.36	0.19 U	0.83	0.18 U	0.28	0.32	<b>37</b>	0.2 U	0.19 U
Biphenyl	200	0.18 U	0.18 U	0.21 U	0.2 U	0.19 U	0.21 U	0.19 U	5.5 U	0.18 U	0.2 U	0.19 U	0.35	0.18 U	0.19 U	0.19 U	13	0.2 U	0.19 U
Carbazole	NE	0.35 U	0.35 U	0.41 U	0.97	0.37 U	0.41 U	0.36 U	11 U	0.34 U	0.38 U	0.36 U	0.73	0.36 U	0.37 U	0.37 U	16	0.39 U	0.37 U
Chrysene	290	0.18 U	0.5	6.2	2.9	1.2	0.42	1.9	34	4.1	1.4	0.3	1.9	0.25	0.55	0.61	84	0.2 U	0.19 U
Dibenz(a,h)anthracene	0.29	0.18 U	0.18 U	<b>0.63</b>	<b>0.44</b>	0.2	0.21 U	0.25	<b>9.1</b>	<b>0.67</b>	0.24	0.19 U	<b>0.32</b>	0.18 U	0.19 U	0.19 U	<b>13</b>	0.2 U	0.19 U
Dibenzofuran	NE	0.18 U	0.18 U	0.51	1.1	0.19 U	0.21 U	0.37	5.5 U	0.24	0.2 U	0.19 U	1.5	0.18 U	0.19 U	0.19 U	35	0.2 U	0.19 U
Dimethylphthalate	NE	0.18 U	0.18 U	0.27	0.25	0.19 U	0.21 U	0.19 U	5.5 U	0.25	0.22	0.19 U	0.18 U	0.18 U	0.26	0.19 U	5.4 U	0.26	0.19 U
Fluoranthene	30,000	0.35 U	0.73 J	16 J	9.4 J	2.5 J	1.1 J	4.3 J	41	6.4	1.6	0.46	6.1	0.37	0.7	1.1	260	0.39 U	0.37 U
Fluorene	30,000	0.18 U	0.18 U	0.95	1.5	0.19 U	0.21 U	0.55	5.5 U	0.9	0.2 U	0.19 U	1.8	0.31	0.19 U	0.19 U	59	0.2 U	0.19 U
Indeno(1,2,3-cd)pyrene	2.9	0.18 U	0.34	1.8	1.4	0.61	0.22	0.87	<b>34</b>	2	0.62	0.2	1.4	0.28	0.56	0.59	<b>49</b>	0.2 U	0.19 U
2-Methylnaphthalene	3,000	0.18 U	0.18 U	0.21 U	0.52	0.19 U	0.21 U	0.22	5.5 U	0.51	0.2 U	0.19 U	1.3	2.7	0.19 U	0.26	42	0.2 U	0.19 U
Naphthalene	17	0.18 U	0.18 U	0.21 U	1.1	0.19 U	0.21 U	0.31	9.8	0.71	0.2 U	0.19 U	3.3	0.18 U	0.19 U	0.19 U	<b>92</b>	0.2 U	0.19 U
Phenanthrene	NE	0.18 U	0.38	9.6	8.8	1.7	0.55	4.4	22	6.5	0.94	0.3	7.8	0.88	0.53	0.87	310	0.2 U	0.19 U
Pyrene	23,000	0.18 UJ	0.7	11	6.9	1.9	0.78	4.4	66	11.5	2.4	0.48	5.4	0.52 J	0.8	1	240	0.2 U	0.19 U
TPH-DRO	420*	9.82 U	45.4	168	145	38.4	61.8	28.7	<b>787</b>	342	61.6	69.6 J	69	<b>2,300</b>	131	117	<b>2,670 J</b>	9.79 U	9.69 U

Notes

Bold value indicates result is greater than EPA RSL for industrial soil.

- \*

Represents most conservative value given for aliphatic and aromatic ranges of TPH-DRO.
- DRO

Diesel-range organics
- EPA

U.S. Environmental Protection Agency
- '

Feet
- FD

Field duplicate
- J

Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- mg/kg

Milligrams per kilogram
- NE

None established
- RSL

Regional screening level
- SVOC

Semivolatile organic compound
- TPH

Total petroleum hydrocarbons
- U

Analyte not detected above method detection limit, which is the value presented.

TABLE 4

SUMMARY OF METALS ANALYSIS OF SURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Sample Number	Analytes and Sample Results (mg/kg)																		
	Aluminum	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Silver	Sodium	Vanadium	Zinc
SB-1 (0-2')	1,500 J	5.5 U	19.6	1.1 U	1,140 J	9.7	1.8	3.7	3,880 J	36.5	671	32.8	2.2 U	3.4	275	2.2 U	88.7	5.9	31.1 J
SB-2 (0-2')	2,440	<b>6.4</b>	32.5	1.0 U	<b>176,000</b>	4.4	1.4	9.6	4,930	34.4	<b>18,500</b>	151	2.0 U	3.4	578	2.0 U	175	8.2	36.2
SB-3 (0-2')	6,950	<b>14.4</b>	142	2.3	<b>42,300</b>	13.4	5.3	<b>117</b>	21,300	<b>235</b>	<b>9,340</b>	466	2.4 U	8.4	1,110	2.4 U	202	25.3	<b>173</b>
SB-4 (0-2')	6,820	<b>11.5</b>	107	1.9	<b>66,900</b>	12.8	4.0	<b>29.9</b>	16,800	<b>188</b>	<b>7,430</b>	274	2.3 U	9.6	986	2.3 U	263	21.6	<b>126</b>
SB-5 (0-2')	10,400	<b>11.6</b>	124	1.9	<b>31,300</b>	14.7	5.7	<b>29.4</b>	16,900	<b>153</b>	<b>5,860</b>	357	2.1 U	11.0	1,520	2.1 U	308	31.6	<b>144</b>
SB-6 (0-2')	10,700	<b>10.8</b>	150	1.9	14,800	13.7	6.7	23.6	18,700	<b>43.7</b>	3,870	936	2.4 U	13.7	1,600	2.4 U	176	36.8	68.8
SB-7 (0-2')	8,340	<b>9.0</b>	60.9	1.3	<b>41,200</b>	11.5	4.1	20.8	11,700	<b>57.8</b>	<b>8,130</b>	224	2.3 U	8.6	861	2.3 U	88.2	26.6	87.6
SB-8 (0-2')	2,270	<b>11.0</b>	59.8	2.0	<b>30,700</b>	7.5	2.4	<b>34.2</b>	13,500	<b>132</b>	2,370	102	2.1 U	2.1 U	617	2.1 U	149	17.0	<b>202</b>
SB-9 (0-2')	2,700	5.3 U	36.0	1.1 U	<b>265,000</b>	7.8	1.7	23.7	6,830	<b>46.1</b>	<b>10,600</b>	164	2.1 U	3.9	526	2.1 U	194	10.6	76.5
SB-10 (0-2')	4,640	<b>13.9</b>	98.9	3.9	<b>37,500</b>	33.7	6.1	<b>111</b>	<b>30,500</b>	<b>329</b>	2,530	309	3.8	22.8	591	2.8	165	30.5	<b>277</b>
SB-11 (0-2')	2,990	<b>9.1</b>	42.0	2.4	<b>189,000</b>	20.6	4.0	<b>34.9</b>	14,300	<b>142</b>	<b>17,300</b>	846	2.2 U	6.0	617	2.4	352	28.5	<b>116</b>
SB-12 (0-2')	2,560	<b>5.5</b>	35.8	1.1	<b>206,000</b>	5.1	3.3	22.6	7,190	<b>106</b>	<b>14,200</b>	284	1.9 U	4.9	501	1.9 U	177	10.2	52.6
SB-13 (0-2')	4,020	5.3 U	50.6	1.3	<b>196,000</b>	6.7	3.4	16.1	8,660	<b>92.1</b>	<b>12,600</b>	497	2.1 U	6.0	713	2.1 U	201	14.9	57.1
SB-14 (0-2')	5,460	<b>12.2</b>	74.4	2.3	<b>144,000</b>	9.4	3.8	<b>39.0</b>	16,400	<b>103</b>	<b>6,700</b>	335	2.2 U	6.3	901	2.3	452	19.0	<b>210</b>
SB-14-FD (0-2')	6,570	<b>15.8</b>	96.7	4.2	<b>85,200</b>	10.4	4.8	<b>49.5</b>	<b>32,000</b>	<b>115</b>	<b>6,220</b>	344	2.6	5.7	985	2.9	523	25.1	<b>270</b>
SB-15 (0-2')	3,170	<b>11.7</b>	66.2	1.8	<b>142,000</b>	8.9	2.4	<b>34.2</b>	12,600	<b>68.8</b>	<b>10,000</b>	121	2.2 U	6.6	530	3.9	158	16.6	<b>116</b>
SB-16 (0-2')	5,750	<b>39.6</b>	87.2	2.8	<b>26,700</b>	9.1	6.6	<b>44.1</b>	19,700	<b>328</b>	<b>6,240</b>	429	2.2 U	7.3	901	2.2 U	224	19.9	<b>191</b>
SB-17 (0-2')	1,200	5.2 U	7.7	1.0 U	<b>430,000</b>	2.3	1.0 U	2.7	1,500	5.2 U	<b>14,500</b>	34.8	2.1 U	2.4	555	2.3	189	5.2 U	13.2
Screening Values (mg/kg)																			
USGS Mean Background	35,400	10.6	NE	NE	18,000	NE	NE	24	23,000	40.95	4,900	1,420	NE	NE	NE	NE	6,600	NE	88.3
EPA RSL for Industrial Soil	1,100,000	3	220,000	980	NE	1,800,000*	350	47,000	820,000	800	NE	26,000	5,800	NE	NE	5,800	NE	5,800	350,000

Notes

Bold value indicates result is greater than a screening value or the USGS reported mean background concentration.

- \*

Represents the RSL for chromium (III).
- EPA

U.S. Environmental Protection Agency
- '

Feet
- FD

Field duplicate
- J

Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- mg/kg

Milligrams per kilogram
- NE

None established
- RSL

Regional screening level
- U

Analyte not detected above method detection limit, which is the value presented.
- USGS

United States Geological Survey

TABLE 5

SUMMARY OF PCB ANALYSIS OF SURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Analyte	EPA RSL for Industrial Soil	Sample Number and Results (mg/kg)																	
		SB-1 (0-2')	SB-2 (0-2')	SB-3 (0-2')	SB-4 (0-2')	SB-5 (0-2')	SB-6 (0-2')	SB-7 (0-2')	SB-8 (0-2')	SB-9 (0-2')	SB-10 (0-2')	SB-11 (0-2')	SB-12 (0-2')	SB-13 (0-2')	SB-14-FD (0-2')	SB-14 (0-2')	SB-15 (0-2')	SB-16 (0-2')	SB-17 (0-2')
Aroclor 1254	0.97	0.035 U	0.035 U	0.041 U	0.038 U	0.054	0.042 U	0.037 U	1.1 U	0.034 U	0.19	0.036 U	0.035 U	0.036 U	0.037 U	0.037 U	1.1 U	0.039 U	0.037 U
Aroclor 1260	0.99	0.035 U	0.035 U	0.041 U	0.038 U	0.037 U	0.042 U	0.037 U	1.1 U	0.29	0.26	0.04	0.035 U	0.037	0.037 U	0.037 U	1.1 U	0.039 U	0.037 U

Notes

- EPA
- U.S. Environmental Protection Agency
- '
- Feet
- FD
- Field duplicate
- mg/kg
- Milligrams per kilogram
- PCB
- Polychlorinated biphenyl
- RSL
- Regional screening level
- U
- Analyte not detected above method detection limit, which is the value presented.

TABLE 6

**SUMMARY OF CYANIDE ANALYSIS OF SURFACE SOIL SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Sample Number	Cyanide Sample Results (mg/kg)
SB-1 (0-2')	0.52 U
SB-2 (0-2')	2.8
SB-3 (0-2')	<b>16.5</b>
SB-4 (0-2')	10.3
SB-5 (0-2')	10.9
SB-6 (0-2')	<b>14.2</b>
SB-7 (0-2')	2.5
SB-8 (0-2')	<b>64.9</b>
SB-9 (0-2')	4.0
SB-10 (0-2')	1.2
SB-11 (0-2')	3.6
SB-12 (0-2')	2.0
SB-13 (0-2')	3.8
SB-14 (0-2')	4.9
SB-14-FD (0-2')	3.7
SB-15 (0-2')	<b>15.7</b>
SB-16 (0-2')	0.55 U
SB-17 (0-2')	0.53 U
<b>EPA RSL for Industrial Soil (mg/kg)</b>	12

## Notes

Bold value indicates result is greater than EPA RSL for industrial soil.

EPA U.S. Environmental Protection Agency

' Feet

FD Field duplicate

mg/kg Milligrams per kilogram

RSL Regional screening level

U Analyte not detected above method detection limit,  
which is the value presented.

TABLE 7

SUMMARY OF VOC AND TPH-GRO ANALYSES OF SUBSURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Analyte	EPA RSL for Industrial Soil (mg/kg)	Sample Number and Results (mg/kg)																	
		SB-1 (5-7')	SB-2 (5-7')	SB-3 (24-26')	SB-4 (16-18')	SB-5-FD (6-8')	SB-5 (6-8')	SB-6 (15-17')	SB-7 (20-22')	SB-8 (31-33')	SB-9 (10-15')	SB-10 (18-20')	SB-11 (14-16')	SB-12 (11-13')	SB-13 (18-20')	SB-14 (22-24')	SB-15 (4-6')	SB-16 (6-8')	SB-17 (12-14')
Benzene	5.1	0.0057 U	0.011 U	<b>580</b>	0.71 U	0.61 U	0.62 U	2.3	0.28 U	0.0094 UJ	<b>6.4</b>	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
Carbon Disulfide	3,500	0.0057 U	0.011	0.56 U	0.71 U	0.61 U	0.62 U	0.29 U	0.28 U	0.0094 UJ	0.59 U	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
Ethyl Benzene	25	0.0057 U	0.011 U	15	0.71 U	0.61 U	0.62 U	0.6	0.28 U	0.0094 UJ	9.5	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
Isopropylbenzene	NE	0.0057 U	0.011 U	0.56 U	0.71 U	0.61 U	0.62 U	0.29 U	0.28 U	0.0094 U	0.59 U	0.0058 U	0.01 U	2.8	2.5	0.31 U	0.65 U	0.0068 U	0.015 U
Methylcyclohexane	NE	0.0057 U	0.011 U	0.56 U	0.71 U	0.61 U	0.62 U	0.29 U	0.28 U	0.0094 J	1.2	0.0058 U	0.01 U	2.2	3.3	0.31 U	0.65 U	0.0068 U	0.015 U
Naphthalene	17	0.011 U	0.022 U	<b>6,600 J</b>	11	2.5	3.9	2.7	8.3	0.019 U	<b>380</b>	0.012 U	0.021 U	3	1.6 U	0.62 U	4.7	0.014 U	0.029 U
Styrene	35,000	0.0057 U	0.011 U	290 J	0.71 U	0.61 U	0.62 U	0.29 U	0.28 U	0.0094 UJ	0.92	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
Toluene	47,000	0.0057 U	0.011 U	390 J	0.71 U	0.61 U	0.62 U	1.3	0.28 U	0.0094 UJ	4.2	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
m and/or p-Xylene	2,400	0.011 U	0.022 U	78	1.4 U	1.2 U	1.2 U	0.94	0.55 U	0.019 U	6.5	0.012 U	0.021 U	1.3 U	1.6 U	0.62 U	1.3 U	0.014 U	0.029 U
o-Xylene	2,800	0.0057 U	0.011 U	31	0.71 U	0.61 U	0.62 U	0.33	0.28 U	0.0094 U	3.2	0.0058 U	0.01 U	0.66 U	0.8 U	0.31 U	0.65 U	0.0068 U	0.015 U
TPH-GRO	420*	3.16 U	4.71 U	<b>1,950</b>	8.25	262	151	151	27.5	5.9 J	200	5.44	2.46 U	205	<b>489</b>	2.56 U	9.22	2.71 U	2.69 U

Notes:

Bold value indicates result is greater than EPA RSL for industrial soil.

- \*

Represents most conservative value given for aliphatic and aromatic ranges of TPH-GRO.
- EPA

U.S. Environmental Protection Agency
- '

Feet
- FD

Field duplicate
- GRO

Gasoline-range organics
- J

Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- mg/kg

Milligrams per kilogram
- NE

None established
- RSL

Regional screening level
- TPH

Total petroleum hydrocarbons
- U

Analyte not detected above method detection limit, which is the value presented.
- VOC

Volatile organic compound



TABLE 8

SUMMARY OF SVOC AND TPH-DRO ANALYSES OF SUBSURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Analyte	EPA RSL for Industrial Soil (mg/kg)	Sample Number and Results (mg/kg)																	
		SB-1 (5-7')	SB-2 (5-7')	SB-3 (24-26')	SB-4 (16-18')	SB-5-FD (6-8')	SB-5 (6-8')	SB-6 (15-17')	SB-7 (20-22')	SB-8 (31-33')	SB-9 (10-15')	SB-10 (18-20')	SB-11 (14-16')	SB-12 (11-13')	SB-13 (18-20')	SB-14 (22-24')	SB-15 (4-6')	SB-16 (6-8')	SB-17 (12-14')
Acenaphthene	45,000	0.29	0.21 U	80	9.2	0.22 U	0.24	5.9	7.5	0.21 U	25	0.23 U	0.21 U	6.7 U	13	0.49	8.9	0.21 U	0.21 U
Acenaphthylene	NE	0.3	0.21 U	370	6.5 U	0.22 U	0.22 U	2.6	19	0.21 U	23	0.23 U	0.21 U	6.7 U	6.7 U	0.53	9.4	0.21 U	0.21 U
Anthracene	230,000	0.77	0.21 U	240	7.9	0.22 U	0.39	16	19	0.21 U	44	0.23 U	0.21 U	6.7 U	6.7 U	0.31	6.4 U	0.21 U	0.21 U
Benzo(a)anthracene	2.9	2.5	0.21 U	<b>210</b>	6.5 U	0.22 U	0.42	<b>19</b>	<b>15</b>	0.21 U	<b>44</b>	0.23 U	0.22	6.7 U	<b>6.9</b>	1.3	<b>25</b>	0.21 U	0.21 U
Benzo(a)pyrene	0.29	<b>2.2</b>	0.21 U	<b>180</b>	6.5 U	0.22 U	<b>0.39</b>	<b>13</b>	<b>14</b>	0.21 U	<b>42</b>	0.23 U	<b>0.29</b>	6.7 U	<b>11</b>	<b>1.6</b>	<b>29</b>	0.21 U	0.21 U
Benzo(b)fluoranthene	2.9	<b>2.9</b>	0.21 U	<b>190</b>	6.5 U	0.22 U	0.31	<b>16</b>	<b>11</b>	0.21 U	<b>34</b>	0.23 U	0.34	6.7 U	<b>11</b>	1.6	<b>30</b>	0.21 U	0.21 U
Benzo(g,h,i)perylene	NE	0.72	0.21 U	63	6.5 U	0.22 U	0.22 U	5.4	6.2	0.21 U	18	0.23 U	0.21 U	6.7 U	10	1	18	0.21 U	0.21 U
Benzo(k)fluoranthene	29	1.1	0.21 U	<b>60</b>	6.5 U	0.22 U	0.22 U	6	5.7 U	0.21 U	11	0.23 U	0.21 U	6.7 U	6.7 U	0.6	9.9	0.21 U	0.21 U
Biphenyl	200	0.21 U	0.21 U	150	6.5 U	0.22 U	0.22 U	2.2 U	9.9	0.21 U	23	0.23 U	0.21 U	6.7 U	6.7 U	0.22 U	6.4 U	0.21 U	0.21 U
bis(2-Chloroethyl)ether	1	0.4 U	0.41	110 U	13 U	0.44 U	0.42 U	4.2 U	11 U	0.4 U	12 U	0.44 U	0.41 U	13 U	13 U	0.43 U	12 U	0.42 U	0.42 U
Carbazole	NE	0.4 U	0.41 U	110 U	13 U	0.44 U	0.42 U	7.5	11 U	0.4 U	12 U	0.44 U	0.41 U	13 U	13 U	0.43 U	12 U	0.42 U	0.42 U
Chrysene	290	2.6	0.21 U	170	6.5 U	0.22 U	0.32	18	13	0.21 U	36	0.23 U	0.21	6.7 U	7.2	1.3	23	0.21 U	0.21 U
Dibenz(a,h)anthracene	0.29	<b>0.37</b>	0.21 U	59 U	6.5 U	0.22 U	0.22 U	<b>2.4</b>	5.7 U	0.21 U	6.3 U	0.23 U	0.21 U	6.7 U	6.7 U	0.26	6.4 U	0.21 U	0.21 U
Dibenzofuran	NE	0.22	0.21 U	200	6.5 U	0.22 U	0.22 U	8.2	5.7 U	0.21 U	18	0.23 U	0.21 U	6.7 U	6.7 U	0.22 U	6.4 U	0.21 U	0.21 U
Dimethylphthalate	NE	0.21 U	0.25	59 U	6.5 U	0.25	0.22 U	2.2 U	7.3	0.23	6.3 U	0.4	0.35	6.7 U	6.7 U	0.27	6.4 U	0.37	0.37
Fluoranthene	30,000	5.5	0.41 U	590	13 U	0.44 U	0.74 J	36 J	29	0.4 U	90	0.44 U	0.41 U	13 U	13 U	2.5	44	0.42 U	0.42 U
Fluorene	30,000	0.31	0.21 U	300	10	0.22 U	0.29	12	18	0.21 U	59	0.23 U	0.21 U	6.7 U	14	0.41	7.3	0.21 U	0.21 U
Indeno(1,2,3-cd)pyrene	2.9	1.3	0.21 U	<b>87.7</b>	6.5 U	0.22 U	0.22 U	<b>5.4</b>	5.7 U	0.21 U	<b>15</b>	0.23 U	0.21 U	6.7 U	<b>9.1</b>	0.87	<b>15</b>	0.21 U	0.21 U
2-Methylnaphthalene	3,000	0.21 U	0.21 U	900	24	0.22 U	0.22 U	7.2	56	0.21 U	170	0.23 U	0.21 U	6.7 U	6.7 U	0.22 U	6.4 U	0.21 U	0.21 U
4-Methylphenol	NE	0.4 U	0.41 U	120	13 U	0.44 U	0.42 U	4.2 U	11 U	0.4 U	12 U	0.44 U	0.41 U	13 U	13 U	0.43 U	12 U	0.42 U	0.42 U
Naphthalene	17	0.31	0.21 U	<b>3,100</b>	<b>38</b>	0.24	0.22 U	<b>19</b>	<b>110</b>	0.21 U	<b>240</b>	0.23 U	0.21 U	11	6.7 U	0.29	6.4 U	0.21 U	0.21 U
Phenanthrene	NE	4.1	0.21 U	1200	33	0.38	1.1	56	85	0.21 U	260	0.23 U	0.21 U	6.7	37	0.37	6.6	0.21 U	0.21 U
Pyrene	23,000	5.8	0.21 U	600	15	0.31	1.1	29	55	0.21 U	170	0.23 U	0.25	6.7 U	17	3	56	0.21 U	0.22
TPH-DRO	420*	97.6	11.1 U	<b>48,700</b>	<b>540</b>	166	164	<b>904</b>	<b>619</b>	24.8	<b>6,080</b>	13.3 U	10.4 U	<b>3,900</b>	<b>13,700 J</b>	10.9 U	<b>2,930</b>	11.2 U	30.7

Notes

Bold value indicates result is greater than EPA RSL for industrial soil.

- \*

Represents most conservative value given for aliphatic and aromatic ranges of TPH-DRO.
- DRO

Diesel-range organics
- EPA

U.S. Environmental Protection Agency
- '

Feet
- FD

Field duplicate
- J

Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- mg/kg

Milligrams per kilogram
- NE

None established
- RSL

Regional screening level
- SVOC

Semivolatile organic compound
- TPH

Total petroleum hydrocarbons
- U

Analyte not detected above method detection limit, which is the value presented.

TABLE 9

SUMMARY OF METALS ANALYSIS OF SUBSURFACE SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri

Sample Number	Analytes and Sample Results (mg/kg)																		
	Aluminum	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Silver	Sodium	Vanadium	Zinc
SB-1 (5-7')	10,100	13.9	174	1.2 U	2.4	16,800	16.1	7.2	50.2	23,600	195	2,830	337	12.1	1,410	2.4 U	129	33.0	177
SB-2 (5-7')	10,000	7.0	139	1.2 U	1.4	11,400	14.5	7.1	15.4	17,500	12.7	2,970	212	12.4	1,600	2.3 U	145	32.0	51.8
SB-3 (24-26')	4,020	5.6	35.7	1.1 U	1.1 U	164,000	8.5	1.4	5.5	5,320	7.5	6,780	74.6	4.3	1,420	2.2 U	398	9.2	22.8
SB-4 (16-18')	6,130	12.1	85.2	1.3 U	1.7	88,000	8.5	4.1	19.9	16,600	95.2	4,920	313	7.0	999	2.5 U	158	21.9	95.8
SB-5-FD (6-8')	12,900	7.6	182	1.3 U	1.7	3,740	15.2	7.2	18.8	19,900	9.6	3,290	623	13.6	1,850	2.6 U	127	38.7	60.2
SB-5 (6-8')	13,800	11.3	180	1.3 U	2.0	6,430	15.4	7.7	19.5	23,500	13.4	3,580	1,520	14.1	1,880	2.6 U	130	39.8	63.1
SB-6 (15-17')	6,500	11.6	132	1.1 U	1.4	82,600	8.0	4.1	29.0	14,000	212	5,010	336	8.0	1,330	2.2 U	308	19.7	103
SB-7 (20-22')	2,760	5.8 U	45.0	1.2 U	1.4	50,500	8.9	2.4	181	11,800	254	5,120	127	8.2	498	2.3 U	164	11.2	3,630
SB-8 (31-33')	5,870	7.9	135	1.2 U	1.2 U	96,800	7.9	3.8	12.0	12,200	367	3,800	313	7.5	1,220	2.4 U	167	19.7	42.1
SB-9 (10-15')	3,360	6.0 U	43.3	1.2 U	1.2 U	342,000	7.7	2.1	12.9	9,740	33.1	2,380	272	4.9	687	2.5	121	10.5	47.7
SB-10 (18-20')	13,500	7.3	216	1.3 U	2.0	10,900 J	15.6	7.3	22.2	22,300	61.2 J	3,470	514 J	20.0	1,600	2.6 U	143	38.2	109
SB-11 (14-16')	7,700	11.3	162	1.2 U	2.2	28,200	11.2	5.0	40.2	22,300	64.8	4,940	267	8.0	1,510	2.4 U	256	29.2	71.5
SB-12 (11-13')	3,730	12.0	58.8	1.2 U	1.2	24,500	4.9	3.4	19.5	14,300	82.3	1,530	98.6	6.1	563	2.5 U	147	13.7	51.5
SB-13 (18-20')	3,590	7.4 U	42.1	1.5 U	1.5 U	91,700	4.4	2.4	16.8	8,560	59.3	1,260	262	4.3	635	3.0 U	133	11.4	33.1
SB-14 (22-24')	5,960	6.6 U	185	1.3 U	1.3 U	26,300	8.3	4.5	11.2	10,800	12.0	6,540	238	8.3	1,330	2.6 U	635	19.4	40.4
SB-15 (4-6')	7,470	18.5	70.6	1.3 U	3.6	4,300	12.3	8.6	21.5	24,500	66.7	962	206	16.8	658	2.5 U	109	19.1	175
SB-16 (6-8')	31,200	23.2	329	1.9	4.2	28,300	31.2	9.4	35.0	36,500	19.6	5,150	1,480	36.4	3,570	3.2	277	58.9	132
SB-17 (12-14')	14,000	12.8	136	1.3 U	2.0	16,400	14.6	6.8	55.0	22,100	29.4	3,040	791	10.4	1,690	2.5 U	294	33.9	66.9
Screening Values (mg/kg)																			
USGS Mean Background Concentration	35,400	10.6	NE	NE	NE	18,000	NE	NE	24	23,000	40.95	4,900	1,420	NE	NE	NE	6,600	NE	88.3
EPA RSL for Industrial Soil	1,100,000	3	220,000	2,300	980	NE	1,800,000*	350	47,000	820,000	800	NE	26,000	NE	NE	5,800	NE	5,800	350,000

Notes

Bold value indicates result is greater than a screening value or the USGS reported mean background concentration.

- \*

Represents the screening RSL for chromium (III).
- EPA

U.S. Environmental Protection Agency
- '

Feet
- FD

Field duplicate
- J

Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- mg/kg

Milligrams per kilogram
- NE

None established
- RSL

Regional screening level
- U

Analyte not detected above method detection limit, which is the value presented.
- USGS

United States Geological Survey

**TABLE 10**

**SUMMARY OF CYANIDE ANALYSIS OF SUBSURFACE SOIL SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Sample Number	Cyanide Sample Results (mg/kg)
SB-1 (5-7')	4.5
SB-2 (5-7')	0.63 U
SB-3 (24-26')	<b>75.4</b>
SB-4 (16-18')	0.89
SB-5-FD (6-8')	0.66 U
SB-5 (6-8')	0.63 U
SB-6 (15-17')	0.62 U
SB-7 (20-22')	1.2
SB-8 (31-33')	0.61 U
SB-9 (10-15')	1.3
SB-10 (18-20')	0.66 U
SB-11 (14-16')	7.9
SB-12 (11-13')	2.4
SB-13 (18-20')	9.1
SB-14 (22-24')	0.63 U
SB-15 (4-6')	0.6 U
SB-16 (6-8')	0.63 U
SB-17 (12-14')	0.62 U
<b>EPA RSL for Industrial Soil (mg/kg)</b>	<b>12</b>

Notes

Bold value indicates result is greater than EPA RSL for industrial soil.

EPA	U.S. Environmental Protection Agency
'	Feet
FD	Field duplicate
mg/kg	Milligrams per kilogram
RSL	Regional screening level
U	Analyte not detected above method detection limit, which is the value presented.

TABLE 11

**SUMMARY OF VOC AND TPH-GRO ANALYSES OF GROUNDWATER SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	EPA MCL (µg/L)	Sample Number and Results (µg/L)										
		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-7-FD	GW-8	GW-9	Field Blank
Benzene	5	<b>110</b>	5.0 U	<b>260</b>	5.0 U	5.0 U	<b>7.6</b>	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethyl Benzene	700	46	87	38	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	450*	16	10	38	5.0 U	5.0 U	15	21	22	5.0 U	5.0 U	5.0 U
Methylcyclohexane	NE	5.0 U	5.0 U	18	5.0 U	5.0 U	7.5	16	17	5.0 U	5.0 U	5.0 U
Naphthalene	0.17*	<b>990 J</b>	<b>3,200 J</b>	<b>330</b>	10 U	10 U	<b>24</b>	10 U	10 U	10 U	10 U	10 U
Toluene	1,000	12	8.5	54	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m and/or p-Xylene	10,000 <sup>a</sup>	23	74	22	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Xylene		20	59	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
TPH-GRO	5.5 <sup>*b</sup>	<b>688</b>	<b>906</b>	<b>1,710 J</b>	40 U	40 U	<b>192</b>	<b>486</b>	<b>388</b>	40 U	40 U	40 U

## Notes

Bold value indicates result is greater than a screening level.

\* No MCL is established for this compound. Screening level represents the EPA RSL for tap water.

<sup>a</sup> Represents MCL for total xylenes.

<sup>b</sup> Represents most conservative value given for aromatic ranges of TPH-GRO.

GRO Gasoline-range organics

EPA U.S. Environmental Protection Agency

FD Field duplicate

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

MCL Maximum contaminant level

µg/L Micrograms per liter

NE None established

RSL Regional screening level

TPH Total petroleum hydrocarbons

U Analyte not detected above method detection limit, which is the value presented.

VOC Volatile organic compound

TABLE 12

**SUMMARY OF SVOC AND TPH-DRO ANALYSES OF GROUNDWATER SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	EPA MCL (µg/L)	Sample Number and Results (µg/L)										
		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-7-FD	GW-8	GW-9	Field Blank
Acenaphthene	530*	52	<b>920</b>	380	20 U	2 U	10	87	150	8 U	8 U	2 U
Acenaphthylene	NE	23	290	61	20 U	2 U	3.9 U	40 U	40 U	8 U	8 U	2 U
Anthracene	1,800*	8.8	660	290	20 U	2 U	3.9 U	52	92	8 U	8 U	2 U
Benzo(a)anthracene	0.012*	<b>2.7</b>	<b>730</b>	<b>350</b>	20 U	2 U	3.9 U	<b>54</b>	<b>90</b>	8 U	8 U	2 U
Benzo(a)pyrene	0.2	<b>2.8 J</b>	<b>740</b>	<b>390</b>	20 U	2 U	<b>7.7</b>	<b>75</b>	<b>120 J</b>	8 U	8 U	2 U
Benzo(b)fluoranthene	0.034*	<b>2.4 J</b>	<b>780</b>	<b>330</b>	20 U	<b>2.1</b>	<b>8.8</b>	<b>88</b>	<b>140 J</b>	8 U	8 U	2 U
Benzo(g,h,i)perylene	NE	2 UJ	220 J	83 J	20 UJ	2 UJ	4.3 J	40 UJ	40 UJ	8 UJ	8 UJ	2 UJ
Benzo(k)fluoranthene	0.34*	2 UJ	<b>310</b>	<b>150</b>	20 U	2 U	3.9 U	40 U	<b>56 J</b>	8 U	8 U	2 U
bis(2-Ethylhexyl)phthalate	NE	5 U	250 U	45 U	50 U	5 U	9.8 U	100 U	100 U	20 U	20 U	19
Chrysene	3.4*	2.6	<b>730</b>	<b>320</b>	20 U	2 U	<b>4.0</b>	<b>55</b>	<b>92</b>	8 U	8 U	2 U
Dibenz(a,h)anthracene	0.0034*	2 UJ	100 U	<b>22</b>	20 U	2 U	3.9 U	40 U	40 UJ	8 U	8 U	2 U
Dibenzofuran	NE	8.8	210	150	20 U	2 U	8.7	54	94	8 U	8 U	2 U
Fluoranthene	800*	7.5	<b>1,300</b>	720	20 U	2 U	5.2	82	140	8 U	8 U	2 U
Fluorene	290*	21 J	<b>920 J</b>	<b>510 J</b>	20 U	2 U	15 J	120 J	210 J	8 U	8 U	2 U
Indeno(1,2,3-cd)pyrene	0.034*	2 UJ	<b>230 J</b>	<b>86 J</b>	20 UJ	2 UJ	<b>4.7 J</b>	40 UJ	<b>46 J</b>	8 UJ	8 UJ	2 UJ
2-Methylnaphthalene	36*	<b>92</b>	<b>1,600</b>	<b>280</b>	20 U	2 U	<b>8.5</b>	40 U	40 U	8 U	8 U	2 U
Naphthalene	0.17*	<b>310</b>	<b>8,400</b>	<b>690</b>	20 U	2 U	<b>28</b>	40 U	40 U	8 U	8 U	2 U
N-nitrosodiphenylamine	12*	2 U	100 U	<b>94</b>	20 U	2 U	3.9 U	40 U	40 U	8 U	8 U	2 U
Phenanthrene	NE	43 J	3,000 J	1500 J	20 U	2 U	23 J	300 J	530 J	8 U	8 U	2 U
Phenol	5,800*	4.7	100 U	18 U	20 U	2 U	3.9 U	40 U	40 U	8 U	8 U	2 U
Pyrene	120*	15 J	<b>2,000 J</b>	<b>1,500 J</b>	20 U	2 U	7.2 J	<b>140 J</b>	<b>240 J</b>	8 U	8 U	2 U
TPH-DRO	100 <sup>a</sup>	<b>1,100</b>	<b>3,335</b>	<b>17,900 J</b>	500 U	500 U	<b>3,890</b>	<b>18,100 J</b>	<b>38,200 J</b>	500 U	500 U	500 U

Notes

Bold value indicates result is greater than a screening value.

\* No MCL is established for this compound. Represents the EPA RSL for tap water.

<sup>a</sup> Represents most conservative value given for aliphatic ranges of TPH-DRO.

DRO Diesel-range organics

EPA U.S. Environmental Protection Agency

FD Field duplicate

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

MCL Maximum contaminant level

µg/L Micrograms per liter

NE None established

RSL Regional screening level

SVOC Semivolatile organic compound

TPH Total petroleum hydrocarbons

U Analyte not detected above method detection limit, which is the value presented.

TABLE 13

**SUMMARY OF TOTAL METALS ANALYSIS OF GROUNDWATER SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	EPA MCL (µg/L)	Sample Number and Results (µg/L)										
		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-7-FD	GW-8	GW-9	Field Blank
Aluminum	20,000*	861	11,700 J	1,970	4,200	315 J	111	810	894	<b>20,300</b>	1,830	50 U
Arsenic	10	25 U	25 UJ	25 U	<b>32</b>	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Barium	2,000	209	1,430 J	465	190	31	283	320	313	279	533	10 U
Beryllium	4	3 U	<b>7 J</b>	3 U	3 U	3 U	3 U	3 U	3 U	3	3 U	3 U
Calcium	NE	121	838 J	357	362	196	234	246	251	510	194	2.00 U
Chromium	22,000* <sup>a</sup>	15 U	16 J	15 U	15 U	15 U	15 U	15 U	15 U	26	15 U	15 U
Cobalt	6*	10 U	<b>28 J</b>	10 U	<b>12</b>	10 U	10 U	10 U	10 U	<b>40</b>	10 U	10 U
Copper	1,300	8	72 J	11	43	5 U	5 U	5 U	5 U	79	5 U	5 U
Iron	14,000*	4,820	<b>40,000 J</b>	<b>16,300</b>	<b>35,600</b>	751 J	1,560	2,000	2,280	<b>89,600</b>	<b>26,000</b>	50 U
Lead	15	<b>90</b>	<b>1,150 J</b>	50 U	<b>1,440</b>	50 U	50 U	50 U	50 U	<b>208</b>	<b>73</b>	50 U
Magnesium	NE	45.4	42.8 J	21.4	36.1	21.5	14.2	11.4	11.5	73.8	72.0	2.00 U
Manganese	430*	197	<b>6,820 J</b>	<b>2,980</b>	<b>2,410</b>	111	<b>576</b>	<b>499</b>	<b>520</b>	<b>5,100</b>	<b>433</b>	5 U
Nickel	390* <sup>b</sup>	20 U	65 J	20 U	20 U	20 U	20 U	20 U	20 U	102	20 U	20 U
Potassium	NE	24.3	31.4 J	20.4	15.0	8.51	9.58	7.74	7.70	18.7	59.7	2.00 U
Selenium	50	50 U	50 UJ	<b>52</b>	<b>60</b>	<b>65</b>	50 U	<b>94</b>	50 U	<b>59</b>	<b>78</b>	50 U
Sodium	NE	46.7	184 J	38.1	54.6	34.6	26.4	23.4	23.7	304	139	5.00 U
Titanium	NE	20 U	161 J	20 U	44	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Vanadium	86*	10 U	78 J	13	18	10 U	10 U	10 U	10 U	<b>100</b>	11	10 U
Zinc	6,000	217	673 J	73	584	49	25 U	29	31	456	117	25 U

## Notes

Bold value indicates result is greater than a screening level.

\* No MCL is established for this compound. Represents the EPA RSL for tap water.

<sup>a</sup> Represents the screening level for chromium (III).

<sup>b</sup> Represents the screening level for nickel soluble salts.

EPA U.S. Environmental Protection Agency

FD Field duplicate

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

MCL Maximum contaminant level

µg/L Micrograms per liter

NE None established

RSL Regional screening level

U Analyte not detected above method detection limit, which is the value presented.

**TABLE 14**

**SUMMARY OF CYANIDE ANALYSIS OF GROUNDWATER SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Sample Number	Cyanide Sample Results (µg/L)
GW-1	<b>695 J</b>
GW-2	<b>663 J</b>
GW-3	<b>239 J</b>
GW-4	10 UJ
GW-5	179 J
GW-6	<b>362 J</b>
GW-7-FD	<b>468 J</b>
GW-7	<b>403 J</b>
GW-8	10 UJ
GW-9	10 UJ
Field Blank	10 UJ
<b>EPA MCL (µg/L)</b>	200

Notes

Bold value indicates result is greater than the EPA MCL.

EPA U.S. Environmental Protection Agency

FD Field duplicate

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

µg/L Micrograms per liter

MCL Maximum contaminant level

U Analyte not detected above method detection limit, which is the value presented

**TABLE 15****SUMMARY OF VOC AND TPH-GRO ANALYSES  
OF SEDIMENT SAMPLES****Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	Sample Number and Results (mg/kg)					
	Sed-1	Sed-1-FD	Sed-2	Sed-3	Sed-4	Sed-5
2-Butanone	0.011 UJ	0.013 UJ	0.015 UJ	4.8 J	0.013 UJ	0.014 UJ
Naphthalene	0.011 UJ	0.013 UJ	0.015 UJ	3.4 J	0.013 UJ	0.014 UJ
Toluene	0.006 UJ	0.006 UJ	0.008 UJ	1.0 UJ	0.007 J	0.007 UJ
TPH-GRO	3.18 U	2.59 U	3.95 U	88.8	2.84 U	3.4 U

## Notes

GRO Gasoline-range organics

FD Field duplicate

J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

mg/kg Milligrams per kilogram

TPH Total petroleum hydrocarbons

U Analyte not detected above method detection limit, which is the value presented.

VOC Volatile organic compound



TABLE 16

**SUMMARY OF SVOC AND TPH-DRO ANALYSES  
OF SEDIMENT SOIL SAMPLES  
Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	Sample Number and Results (mg/kg)					
	Sed-1	Sed-1-FD	Sed-2	Sed-3	Sed-4	Sed-5
Acenaphthene	0.18 U	0.18 U	0.23 U	5.2	0.21 U	0.21 U
Anthracene	0.18 U	0.18 U	0.23 U	3.7	0.21 U	0.21 U
Benzo(a)anthracene	0.18 U	0.54	1.2	4.3	0.21 U	0.21 U
Benzo(a)pyrene	0.18 U	0.54	1.2	4.2	0.21 U	0.21 U
Benzo(b)fluoranthene	0.18 U	0.39	0.7	1.8	0.21 U	0.21 U
Benzo(g,h,i)perylene	0.18 U	0.34	0.62	2.0	0.21 U	0.21 U
Benzo(k)fluoranthene	0.18 U	0.34	0.62	2.0	0.21 U	0.21 U
bis(2-Ethylhexyl)phthalate	0.24	0.18 U	0.23 U	0.22 U	0.21 U	0.4
Chrysene	0.18 U	0.46	0.94	4.1	0.21 U	0.21 U
Dibenz(a,h)anthracene	0.18 U	0.18 U	0.23 U	0.76	0.21 U	0.21 U
Dibenzofuran	0.18 U	0.18 U	0.23 U	1.0	0.21 U	0.21 U
Fluoranthene	0.18 U	1.0	1.2	11	0.4 U	0.41 U
Fluorene	0.18 U	0.18 U	0.23 U	3.9	0.21 U	0.21 U
Indeno(1,2,3-cd)pyrene	0.18 U	0.32	0.5	1.8	0.21 U	0.21 U
2-Methylnaphthalene	0.18 U	0.18 U	0.23 U	0.52	0.21 U	0.21 U
Naphthalene	0.18 U	0.18 U	0.23 U	0.22 U	0.21 U	0.21 U
Phenanthrene	0.18 U	0.25	0.23 U	12	0.21 U	0.21 U
Pyrene	0.18 U	0.75	2.3	13	0.21 U	0.21 U
TPH-DRO	9.2 U	9.3 U	12 U	962	10 U	11 U
Total PAHs	NA	<b>2.78</b>	<b>4.9</b>	<b>48</b>	NA	NA
<b>Screening Levels (mg/kg)</b>						
Freshwater Sediment TEC for Total PAHs	1.61					
Freshwater Sediment PEC for Total PAHs	22.8					

## Notes

Bold value indicates result is greater than a screening level.

DRO	Diesel-range organics
FD	Field duplicate
mg/kg	Milligrams per kilogram
NA	Not applicable
PAH	Polycyclic aromatic hydrocarbons
PEC	Probable effect concentration
SVOC	Semivolatile organic compounds
TEC	Threshold effect concentration
TPH	Total petroleum hydrocarbons
U	Analyte not detected above method detection limit, which is the value presented.

TABLE 17

**SUMMARY OF METALS ANALYSIS OF SEDIMENT SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Analytes	Screening Levels (mg/kg)		Sample Number and Results (mg/kg)					
	Freshwater Sediment TEC	Freshwater Sediment PEC	Sed-1-FD	Sed-1	Sed-2	Sed-3	Sed-4	Sed-5
Aluminum	NE	NE	3,260	3,760	8,740	7,400	2,490	3,262
Antimony	NE	NE	2.2 U	2.3	2.7 U	3.0 U	2.6 U	2.5 U
Arsenic	9.79	33,000	5.4 U	5.4 U	7.2	7.4 U	6.6 U	6.2 U
Barium	NE	NE	101	111	147	145	328	161
Cadmium	0.99	4.98	1.1 U	1.1 U	<b>2.0</b>	1.5 U	1.3 U	1.2 U
Calcium	NE	NE	50,200	15,600	67,800	9,540	8,470	9,140
Chromium	43.4	111	5.0	5.6	10.4	8.6	5.5	2.7
Cobalt	NE	NE	2.6	2.9	4.5	4.4	2.4	3.5
Copper	31.6	149	3.7	4.2	15.0	8.0	6.2	3.1
Iron	NE	NE	5,620	6,750	19,400	10,800	11,300	7,080
Lead	35.8	128	6.6	7.5	21.1	7.4 U	7.5	6.8
Magnesium	NE	NE	2,520	2,990	11,000	3,310	2,550	3,200
Manganese	NE	NE	144	162	607	308	150	161
Nickel	22.7	48.6	3.9	4.3	6.0	7.4	3.7	6.2
Potassium	NE	NE	590	657	1,270	1,140	451	549
Sodium	NE	NE	119	127	212	204	166	196
Vanadium	NE	NE	9.7	11.2	20.0	19.2	11.0	13.8
Zinc	121	459	23.0	20.6	39.7	28.5	21.9	24.6

## Notes

Bold value indicates result is greater than a screening level.

FD Field duplicate

mg/kg Milligrams per kilogram

NE None established

PEC Probable effect concentration

TEC Threshold effect concentration

U Analyte not detected above method detection limit, which is the value presented.

**TABLE 18**

**SUMMARY OF CYANIDE ANALYSIS OF  
SEDIMENT SAMPLES**

**Laclede Coal Gas Site, St. Louis, Missouri**

Sample Number	Cyanide Sample Results (mg/kg)
Sed-1	0.51
Sed-1-FD	0.63
Sed-2	0.55
Sed-3	0.30 U
Sed-4	0.28 U
Sed-5	0.31 U

Notes

FD	Field duplicate
mg/kg	Milligrams per kilogram
U	Analyte not detected above method detection limit, which is the value presented.

TABLE 19

**SUMMARY OF METALS ANALYSIS OF SURFACE WATER SAMPLES**  
**Laclede Coal Gas Site, St. Louis, Missouri**

Analyte	Missouri Water Quality Standards (µg/L)		Sample Number and Results (µg/L)						
	Acute AQL	Chronic AQL	SW-1	SW-1-FD	SW-2	SW-3	SW-4	SW-5	Field Blank
Aluminum	750	NE	<b>1,080</b>	<b>1,090</b>	<b>1,360</b>	<b>1,340</b>	<b>1,190</b>	50 U	50 U
Barium	NE	NE	185	189	200	191	188	35	10 U
Calcium	NE	NE	76,000	78,000	80,600	76,600	74,800	59,800	2,000 U
Copper	26	16	7	6	7	6	7	5.0 U	5.0 U
Iron	NE	1,000	<b>1,720</b>	<b>1,790</b>	<b>2,000</b>	<b>2,050</b>	<b>1,970</b>	858	50 U
Magnesium	NE	NE	27,300	28,300	29,300	26,900	27,000	16,500	2,000 U
Manganese	NE	NE	435	454	466	516	471	31	5.0 U
Potassium	NE	NE	7,860	7,910	8,170	7,650	7,690	6,980	2,000 U
Sodium	NE	NE	75,200	77,700	79,800	72,700	72,800	25,400	5,000 U
Vanadium	NE	NE	10	11	10 U	10	10	10 U	10 U
Zinc	211	211	25 U	25 U	29	27	25 U	36	25 U

Notes

Bold value indicates result is greater than a screening level.

AQL      Protection of aquatic life

FD      Field duplicate

µg/L      Micrograms per liter

NE      None established

U      Analyte not detected above method detection limit, which is the value presented.

**ATTACHMENT 1**  
**QUICKSCORE VERSION 3.1 SCORESHEETS**

\*\*\*\* CONFIDENTIAL \*\*\*\*  
 \*\*\*\*PRE-DECISIONAL DOCUMENT \*\*\*\*  
 \*\*\*\* SUMMARY SCORESHEET \*\*\*\*  
 \*\*\*\* FOR COMPUTING PROJECTED HRS SCORE \*\*\*\*

\*\*\*\* Do Not Cite or Quote \*\*\*\*

Site Name: Laclede Coal Gas Site                      Region: Region 7  
 Scenario Name: PAHs released to sediment  
 City, County, State: St. Louis City / St. Louis County, Missouri                      Evaluator: Jenna Mead

EPA ID#: MOD981715980                      Date: 06/01/2016

Lat/Long: 38:38:32,90:10:60

Congressional District:

This Scoresheet is for:

Scenario Name: PAHs released to sediment

Description: PAHs have been detected in Mississippi River sediments adjacent to the former Laclede Coal Gas site

	S pathway	S <sup>2</sup> pathway
Ground Water Migration Pathway Score (S <sub>gw</sub> )	0.0	0.0
Surface Water Migration Pathway Score (S <sub>sw</sub> )	24.62	606.14
Soil Exposure Pathway Score (S <sub>s</sub> )	0.0	0.0
Air Migration Score (S <sub>a</sub> )	0.0	0.0
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		606.14
$(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		151.54
$\sqrt{(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4}$		12.31

Pathways not assigned a score (explain):

Soil, air, and groundwater pathways were not scored for this site. The soil pathway was not scored due to lack of residential and nearby population. The air pathway was not scored because no air sampling had been conducted. The groundwater pathway was not scored because groundwater is not used in the area.

**TABLE 4-1 --SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET**

Factor categories and factors	Maximum Value	Value Assigned
Watershed Evaluated: Mississippi River, Upper		
<b>Drinking Water Threat</b>		
<b>Likelihood of Release:</b>		
1. Observed Release	550	550.0
2. Potential to Release by Overland Flow:		
2a. Containment	10	0.0
2b. Runoff	10	0.0
2c. Distance to Surface Water	5	3.0
2d. Potential to Release by Overland Flow [(lines 2a(2b + 2c)]	35	0.0
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	0.0
3b. Flood Frequency	50	0.0
3c. Potential to Release by Flood (lines 3a x 3b)	500	0.0
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	0.0
5. Likelihood of Release (higher of lines 1 and 4)	550	550.0
<b>Waste Characteristics:</b>		
6. Toxicity/Persistence	(a)	10000.0
7. Hazardous Waste Quantity	(a)	10.0
8. Waste Characteristics	100	18.0
<b>Targets:</b>		
9. Nearest Intake	50	0.0
10. Population:		
10a. Level I Concentrations	(b)	0.0
10b. Level II Concentrations	(b)	0.0
10c. Potential Contamination	(b)	0.2
10d. Population (lines 10a + 10b + 10c)	(b)	0.2
11. Resources	5	5.0
12. Targets (lines 9 + 10d + 11)	(b)	5.2
<b>Drinking Water Threat Score:</b>		
13. Drinking Water Threat Score [(lines 5x8x12)/82,500, subject to a max of 100]	100	0.62
<b>Human Food Chain Threat</b>		
<b>Likelihood of Release:</b>		
14. Likelihood of Release (same value as line 5)	550	550.0
<b>Waste Characteristics:</b>		
15. Toxicity/Persistence/Bioaccumulation	(a)	5.0E8
16. Hazardous Waste Quantity	(a)	10.0
17. Waste Characteristics	1000	180.0
<b>Targets:</b>		
18. Food Chain Individual	50	20.0
19. Population		
19a. Level I Concentration	(b)	0.0
19b. Level II Concentration	(b)	0.0
19c. Potential Human Food Chain Contamination	(b)	0.0
19d. Population (lines 19a + 19b + 19c)	(b)	0.0
20. Targets (lines 18 + 19d)	(b)	20.0
<b>Human Food Chain Threat Score:</b>		
21. Human Food Chain Threat Score [(lines 14x17x20)/82500, subject to max of 100]	100	24.0
<b>Environmental Threat</b>		
<b>Likelihood of Release:</b>		
22. Likelihood of Release (same value as line 5)	550	550.0
<b>Waste Characteristics:</b>		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	5.0E8
24. Hazardous Waste Quantity	(a)	10.0
25. Waste Characteristics	1000	180.0

**Targets:**

26. Sensitive Environments		
26a. Level I Concentrations	(b)	0.0
26b. Level II Concentrations	(b)	0.0
26c. Potential Contamination	(b)	0.0
26d. Sensitive Environments (lines 26a + 26b + 26c)	(b)	0.0
27. Targets (value from line 26d)	(b)	0.0

**Environmental Threat Score:**

28. Environmental Threat Score [(lines 22x25x27)/82,500 subject to a max of 60]	60	0.0
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**Surface Water Overland/Flood Migration Component Score for a Watershed**

29. Watershed Score <sup>c</sup> (lines 13+21+28, subject to a max of 100)	100	24.62
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**Surface Water Overland/Flood Migration Component Score**

30. Component Score (S <sub>sw</sub> ) <sup>c</sup> (highest score from line 29 for all watersheds evaluated)	100	24.62
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<sup>a</sup> Maximum value applies to waste characteristics category

<sup>b</sup> Maximum value not applicable

<sup>c</sup> Do not round to nearest integer